

## U.S. Department of Commerce Case Study: Communication, Consensus Building, Collaboration & Cooperation (C4)

**Ira M. Grossman**

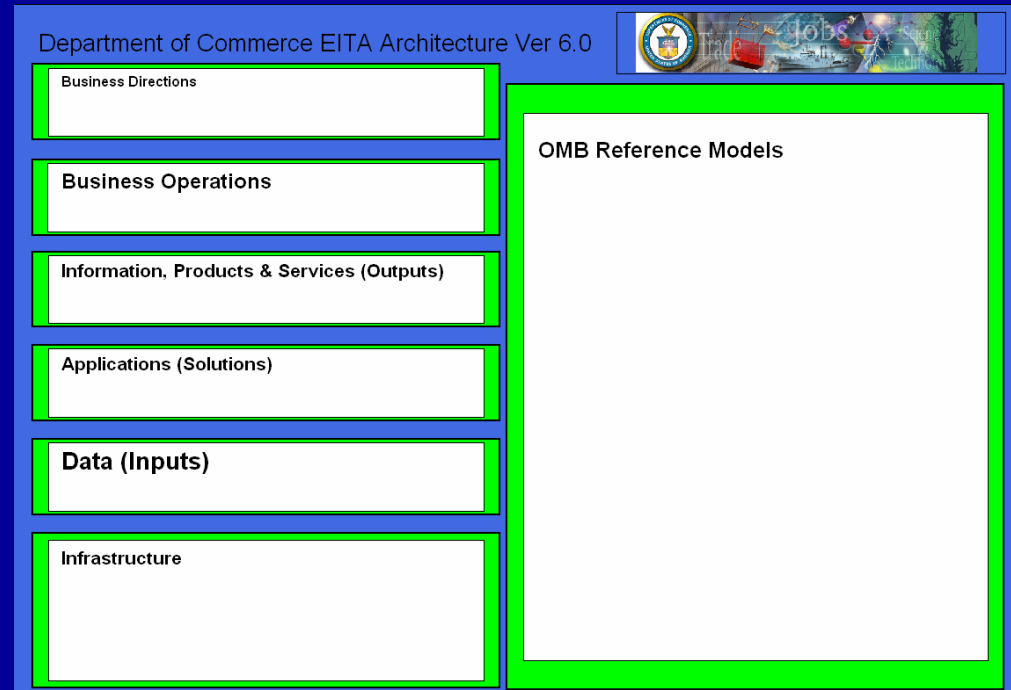
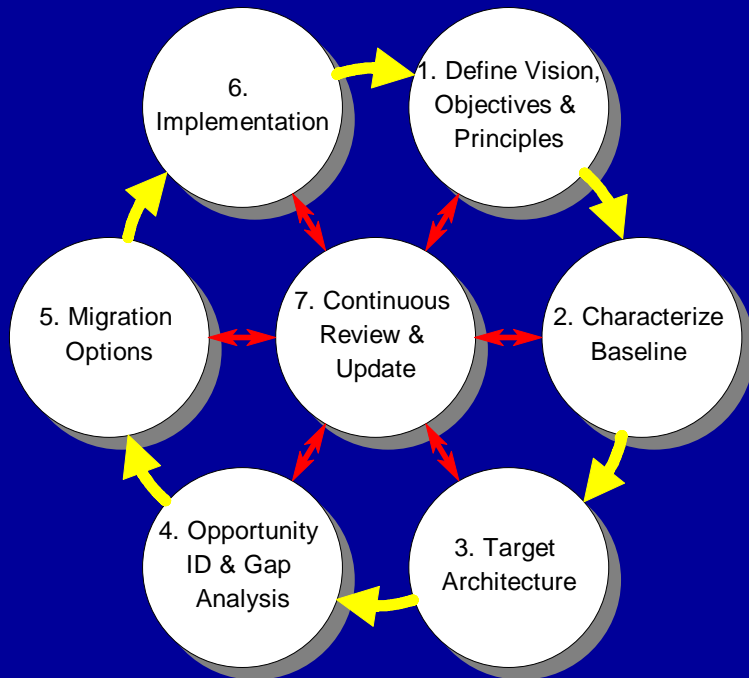
**Chief Architect, Department of Commerce  
National Oceanic and Atmospheric Administration  
Wednesday, May 05, 2004**



# Department of Commerce Enterprise IT Architecture

**Objective: Describe how the Department of Commerce's (DoC) Federated Enterprise Architecture has continued to mature and what best practices contributed to this progress.**

**<https://secure.cio.noaa.gov/hpcc/docita/>**



**Disclaimer:** The opinions expressed in this presentation are solely those of the speaker and are not those of the Department of Commerce or the National Oceanic and Atmospheric Administration.

## Since the Last Time

Result of excellent communication, consensus building, collaboration and cooperation throughout the organization

- **(Have only) Begun to demonstrate real benefits to the Department**
- Successfully selected and standardized on a visual EA modeling tool
- **Improved our EA Capability Maturity scores**
- **Instituted an in-house independent validation and verification capability of each Operating Unit's maturity**
- **Begun to ascertain how to utilize and benefit from the information contained in OMB's Federal Enterprise Architecture Management System (FEAMS)**



## Outline

- **Communication**
- **Consensus Building**
- **Collaboration**
- **Cooperation**





## Department of Commerce

### Enterprise IT Architecture Advisory Group Home Page

#### Next Meeting

**May 5, 2004 9:30 AM**  
**HCHB Room 6621**  
**NOAA EA Metis Workshop**  
**April 26, 2004 8:30 AM**  
**SSMC 4 Room 1W611**  
**Metis Users Group Meeting**  
**April 28 - 30, 2004**  
**NOAA Science Center**

#### Meeting Minutes

[Click here for Meeting Minutes](#)

The Department of Commerce Enterprise IT Architecture Advisory Group is a resource to help address, research, refine, and promote the use of Enterprise IT Architecture as a strategic information management practice throughout the Department of Commerce. Serve as technical counsel to the DoC Chief Information Officer (CIO) and the CIO Council on the subject of Enterprise IT Architecture. Make recommendations and provide advice to the DoC CIO and the CIO Council with respect to policy, procedures, and standards related to the maintenance and update of the Enterprise IT Architecture. Review all operating unit IT architectures and provide recommendations through the CIO to the operating unit CIOs.

#### DoC Architecture Rqts

**(2004 Update)**

[Enterprise IT Architecture Call Memo Due Mar 31, 2004](#) |

[Guidance: What is it?](#) | [Guidance List](#) | [Evaluation Criteria](#) | [Performance Element for DoC Operating Unit CIOs](#) | [Comments on IT Architecture Submissions Table](#) |

[Department Goals, Objectives, Outcomes, and Performance Measures](#) | [DOC Strategic Plan](#)

#### EITA Advisory Group Docs

[Enterprise IT Architecture Advisory Group Charter](#) **(New!)**

#### Capability Maturity Model (Updated for FY 2003)

[Introduction](#) | [DoC IT ACMM](#) | [ACMM Characteristics](#) | [DoC ACMM Scorecard](#) | [Complete Set of FY 2003](#)

[ACCM Documents - Revision 1](#) **(Revised - May 20, 2003)** | [NASCIO Enterprise Architecture Maturity Model](#) | [NASCIO EAMM Validation Report](#)

#### Technical Reference Model & Standards Profile Framework

[TRM & SP Framework Guidance](#)

#### OMB Reference Models

**(Updated September 8, 2003)**

[The Business Reference Model Version 2.0](#) | [Performance Reference Model Version 1.0 Volume I](#) | [Performance Reference Model Version 1.0 Volume II](#) | [The Service Component Reference Model Version 1.0](#) | [The Technical Reference Model Version 1.1](#)

#### Laws/Regulations

[Clinger/Cohen Act](#)

| [Exec Order 13011](#)

[Revised OMB Circular A-130](#) | [Appendix I](#) | [Appendix II](#) | [Appendix III](#) | [Appendix IV](#) | [Federal Register Dec 12, 2000 Summary of OMB A-130 Revision](#) | [E-Government Act of 2002](#) |

#### References/Guidance

**(Expanded)**

[Federal EA Framework Ver 1.1](#) | [Architecture Alignment and Assessment Guide Oct 2000](#) | [Practical Guide to Federal Enterprise Architecture](#) | [DoD Joint Technical Architecture](#) | [DoD Technical Reference Model TQAF Ver 7](#) | [E-Government Strategy](#) | [GAO, IT Investment Management: A Framework for Assessing and Improving Process Maturity, Exposure Draft, Version 1](#), [GAO/AIMD-10-1-23, May 2000](#) | [GAO 02-6, Enterprise Architecture Use Across the Federal Government Can Be](#)

[Improved](#) | [GAO 03-584G Information](#)

[Technology: A Framework for Assessing and Improving Enterprise Architecture Management \(Version 1.1\)](#) | [GAO 04-40 Leadership Remains Key to Agencies Making Progress on Enterprise Architecture Efforts](#) **(New!)**

#### Briefings/Papers

[Briefing to Bureau of Census 7-27-99](#) | [IT Briefings 7-16-98 & 8-17-98](#) | [Proposal | An IT Enterprise Architecture Process Model Paper](#) | [An Information Technology Enterprise Architecture Process Model](#)

[INCOSE 99 Presentation](#) | [Briefing to NIST 9-13-2000](#) | [Electronic Government: An Overview - K Hogan](#)

[November 2000](#) | [Case Study: Establishing Federated Information Technology \(IT\) Architectures at DoC & NOAA May 17, 2001](#) | [PowerPoint Version](#) | [Briefing to EPA July 26, 2001](#) | [Census Briefing to IT Architecture](#)

[Affinity Group June 4, 2002](#) | [Case Study: Department of Commerce: Implementing the Federated IT Enterprise Architecture](#)

#### DoC IT Architecture Documents

#### IT Security Architecture Refs.

[Engineering Principles for IT Security](#) | [Federal Information Technology Security Assessment Framework](#)

#### DoC EA Best Practices NOAA IT Principles

#### DoC EA Media Articles

[Measuring the benefits](#)

[Architecture due diligence](#)

[Get down to business with an architecture](#)

[Tools to put the wheels on EA](#)

[Tech Success: Enterprise architecture made simple](#)

[EA by the slice](#)

[Modeling Tools Maps NOAA's Operations With VOIP, digital department comes of age at Commerce](#)

#### IT Architecture Links

| [Federal Chief Information Officers \(CIO\) Council](#) | [Federal Enterprise Architecture Program Management Office \(FEAPMO\)](#) | [National Association of State Chief Information Officers \(NASCIO\)](#) |

"I believe there is a train under here somewhere!"



<http://www.photolib.noaa.gov/historic/nws/wea00958.htm>

January 25, 2000: **Ferocious snowstorm** ambushed the Washington DC region with up to 19 inches of snow. [Washington Post] The worst in four years in the nation's capital -- closed government offices, schools and Ronald Reagan Airport in Washington before making its way into New York and Boston. Some federal employees didn't learn about the closing until after they left for work. [CNN]

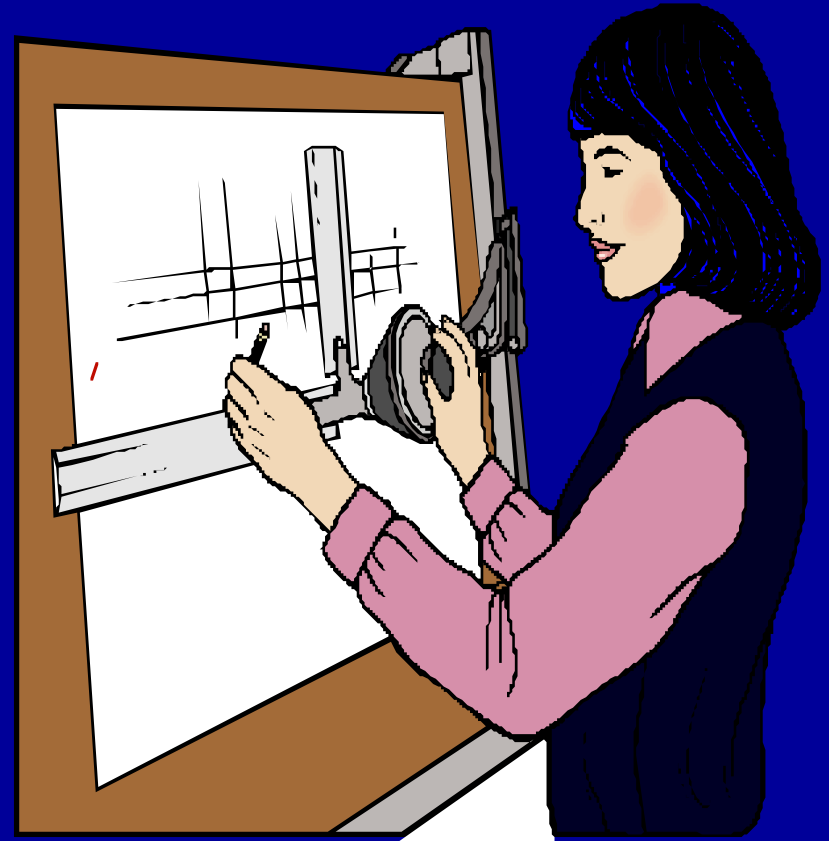


## Communication – Department of Commerce Enterprise IT Architecture Development



## What is an Enterprise Architecture?

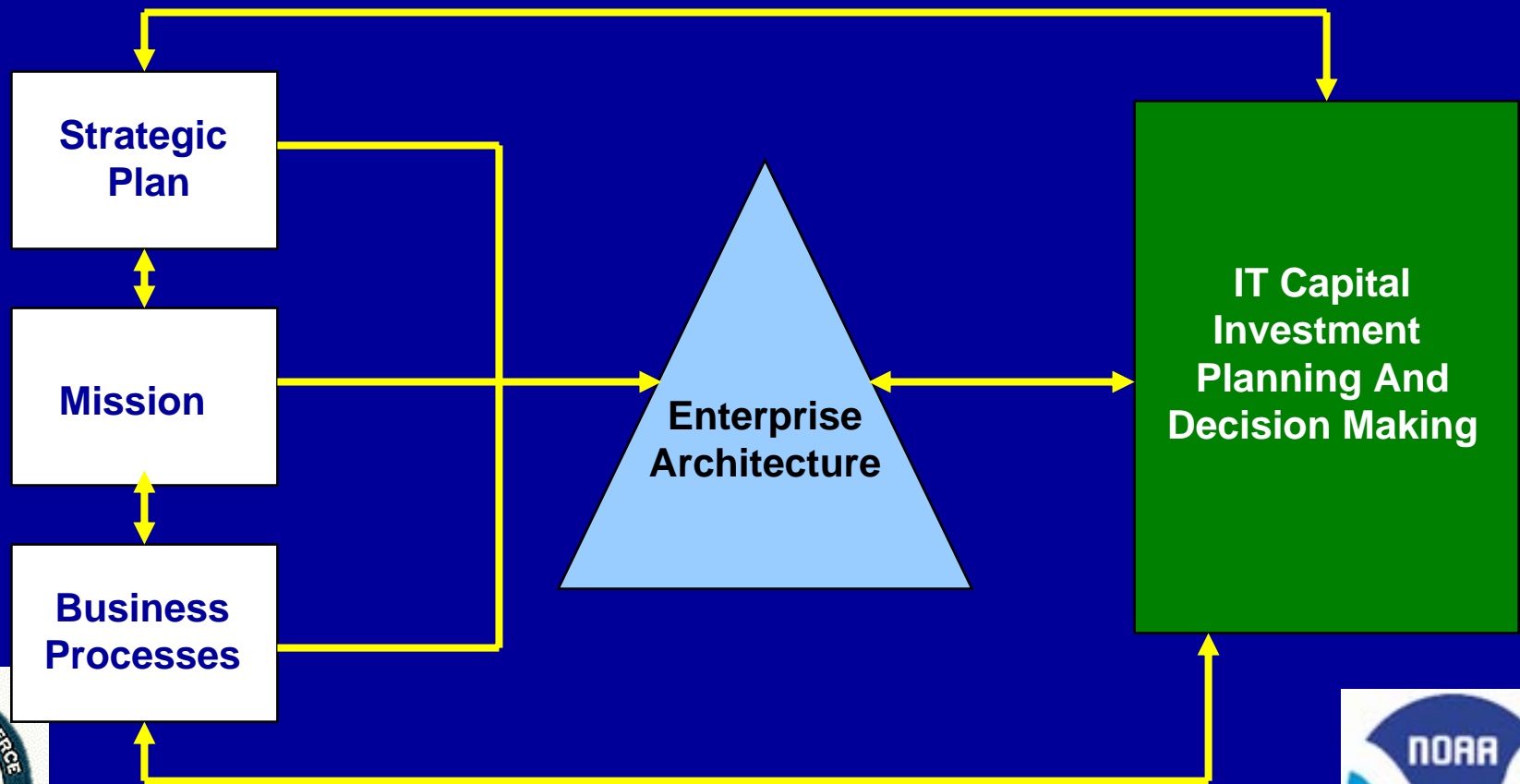
- A blueprint that explains how all the IT Management and Infrastructure elements work together as a whole
- Provides an ability to make more intelligent decisions on how we spend our money



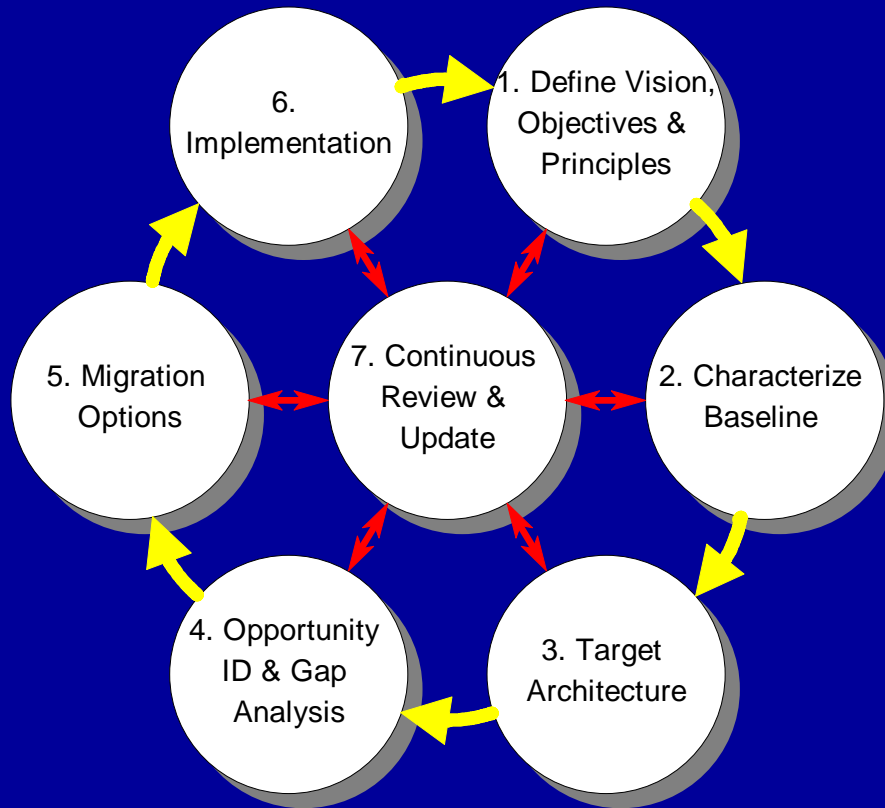


## Vision

To Clearly Link **Strategic Plan, Mission, and Business Processes** to **Enterprise Architecture** to **Capital IT Investment Planning and Decision Making**



## DoC Enterprise IT Architecture Process



<https://secure.cio.noaa.gov/hpcc/docita>



## Dept of Commerce Enterprise Architecture Process

1. **Define Vision, Objectives and Principles**
2. **Characterize Enterprise Architecture Baseline**
3. **Create Target Architecture**
4. **Conduct Gap Analysis**
5. **Develop Migration Plan**
6. **Implement**
7. **Continuously Review and Update Enterprise Architecture**



## This Is the Department of Commerce



U.S. Department of Commerce  
Bureau of Economic Analysis

Economics and Statistics Administration  
American Jobs American Values  
U.S. DEPARTMENT OF COMMERCE



U.S. Department of Commerce  
National Technical Information Service  
The Central Source For Government Information  
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## Department of Commerce Organizations

- **Office of the Secretary**
- **Bureau of Industry and Security**
- **Economics and Statistics Administration**
  - Bureau of Economic Analysis
  - Bureau of the Census
- **Economic Development Administration**
- **International Trade Administration**
- **Minority Business Development Agency**
- **National Oceanic & Atmospheric Administration**
- **National Telecommunications & Information Administration**
- **Office of Inspector General**
- **Patent and Trademark Office**
- **Technology Administration**
  - National Institute of Standards & Technology
  - National Technical Information Service
  - Office of Technology Policy



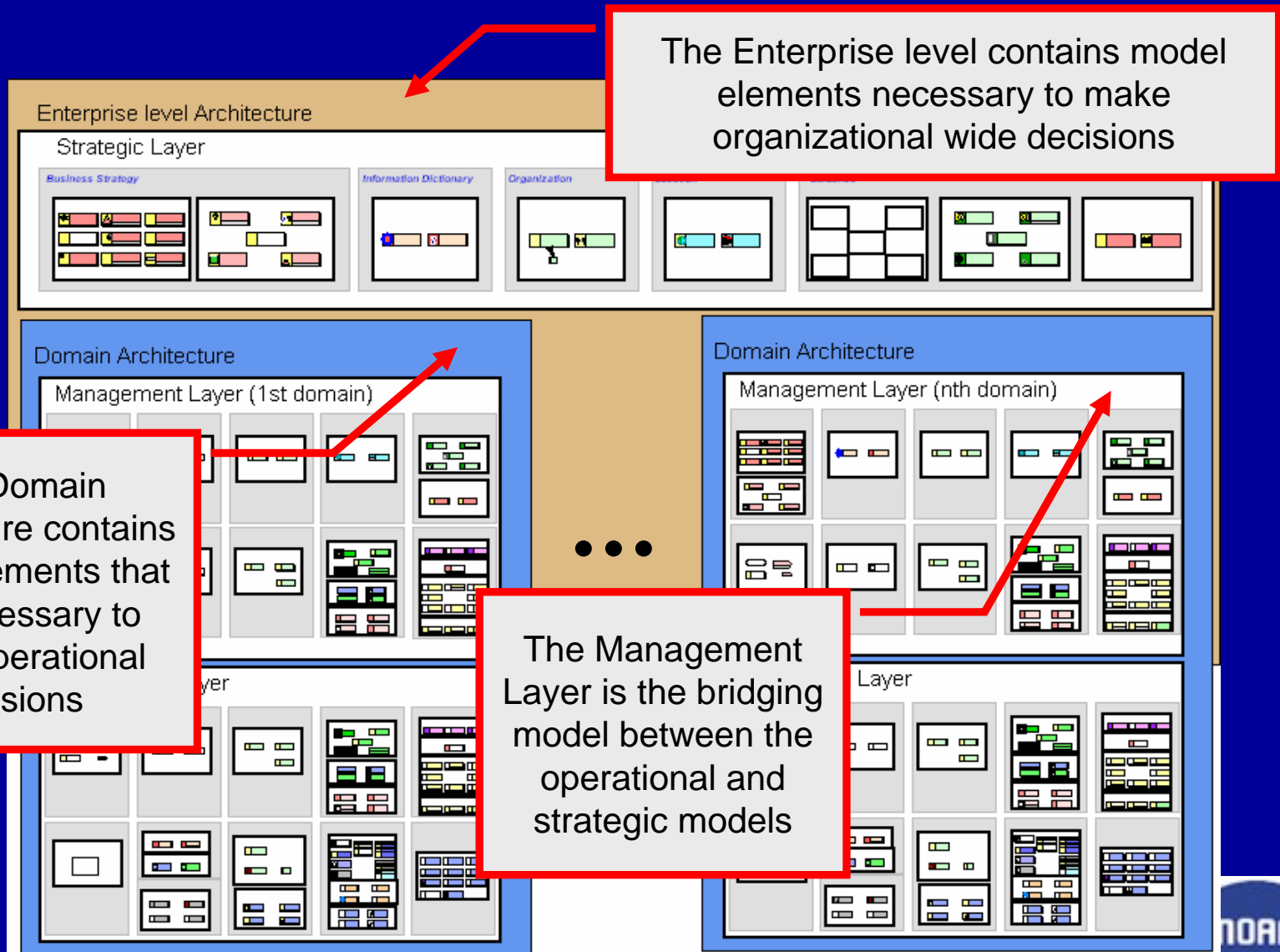
## What Is a Federated IT Architecture?

- Defines the common or shared enterprise architecture principles and standards across each agency listed in the Clinger-Cohen Act.
- Allows each agency to maintain enough diversity and uniqueness necessary to accomplish its mission, while providing for government-wide interoperability and commonality.





# A Federated Approach



The Enterprise level contains model elements necessary to make organizational wide decisions

The Domain Architecture contains model elements that are necessary to make operational decisions

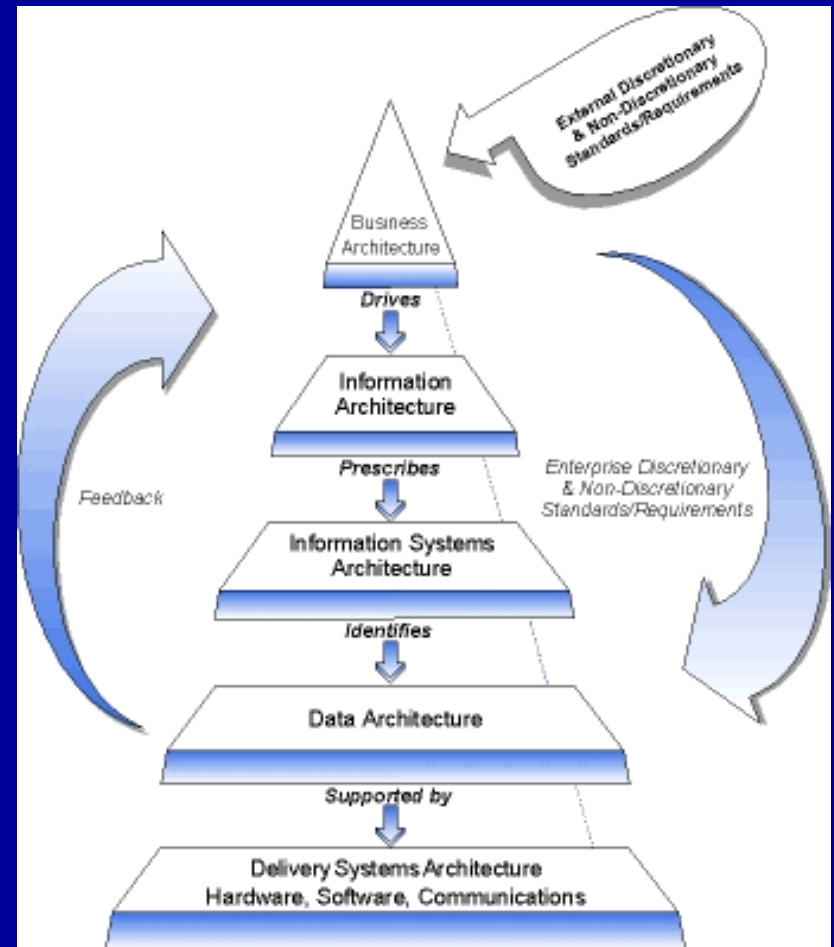
The Management Layer is the bridging model between the operational and strategic models



## NIST Enterprise Architecture Framework

- **IT Architecture Components**
  - **Business Process**
  - **Information Flows and Relationships**
  - **Applications**
  - **Data Descriptions**
  - **Technology Infrastructure**

*OMB Circular A-130, Management of Federal Information Resources, November 28, 2000*



*NIST Special Publication 500-167, Information Management Directions: The Integration Challenge” September, 1989*





**Business Directions**

**Business Operations**

**Information, Products & Services (Outputs)**

**Applications (Solutions)**

**Data (Inputs)**

**Infrastructure**

**OMB Reference Models**

# Department of Commerce EITA Architecture Ver 6.0



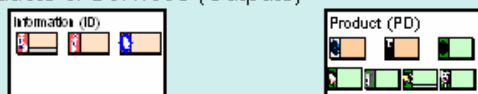
## Business Directions



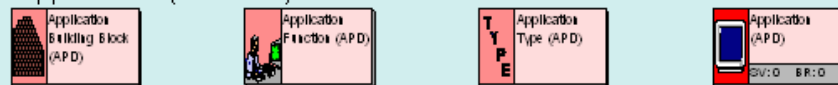
## Business Operations



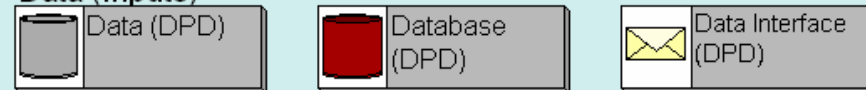
## Information, Products & Services (Outputs)



## Applications (Solutions)



## Data (Inputs)

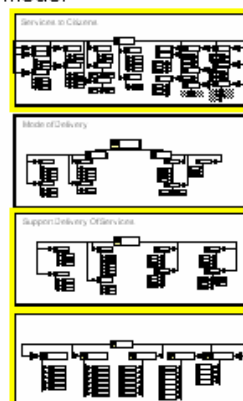


## Infrastructure



## OMB Reference Models

### Business Reference Model



### Service Reference Model



### Technical Reference Model

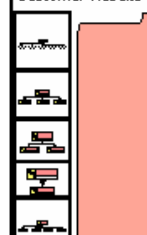


### Performance Reference Model

#### Mission and Business Results



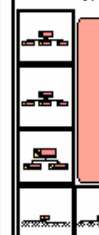
#### Customer Results



#### Processes and



#### Technology



### Data Reference Model

## Evaluation Criteria - Architecture Development Checklist

1. **Identify Business Processes that will be the bases for Architectures**
2. **Develop and document IT Architectural Principles for each of the IT Architecture views**
3. **Ensure that the IT Architecture Principles and other Architecture efforts are integrated with strategic planning and budgeting processes**
4. **Characterize and document the Baseline Architecture based on the IT Architecture views**
5. **Develop and document a Target Architecture based on the IT Architecture views**



## Evaluation Criteria - Architecture Development Checklist

6. **Create a Technical Reference Model and Standards Profile.**
7. **Conduct a Gap Analysis showing where the Baseline Architecture and the Target Architecture differ**
8. **Develop and document a Migration Plan to accommodate the organization's capacity to handle change**
9. **Implement Migration Plan**  
**Contingent upon the budget process and upon obtaining the necessary funds to proceed**





## Evaluation Criteria - Architecture Development Checklist

- 10. Establish a Governance Structure to ensure enterprise-wide compliance with IT Architecture.**
- 11. Conduct an Enterprise Architecture Capability Maturity self assessment**



## NOAA IT Principles

- **Meta Principles**
- **Business Process Principles (NOAA's Mission)**
- **Data Principles**
- **Application Principles**
- **Technology Infrastructure Principles**



## Communication - Enterprise IT Architecture Capability Maturity Model



## Case Studies: Practical Strategies to Integrate Agency Management Processes EA and CPIC

- “...officials noted the central aspect of their EA and CPIC integration efforts is their coordination as each process matures. To accomplish this, **Agency B** has a capability maturity model for EA and a maturity model for CPIC. **Both maturity models include cross-references and linkages to a number of key management processes, including EA, CPIC, IT security, etc.**”



## Enterprise Architecture Capability Maturity Model

- **Ensure that the Department** continues to build on Enterprise Architecture efforts and fully realizes the benefits
- **Assess IT processes**
- Ascertain where we are and where we should be headed within the organization
- **Enhance the overall odds for success**
- CIOs use as a self-assessment tool
- **Identify weak areas and provide a defined path towards improvement.**
- **As the Architecture matures it should increase the benefits it offers the organization**



## Enterprise Architecture Capability Maturity Model

- Tools

- Department of Commerce (DoC) IT Architecture Maturity Model
- Characteristics of DoC Operating Units' IT Architecture Processes at Different Maturity Levels
- DoC IT Architecture Capability Scorecard
- Independent Validation & Verification of Maturity Scores

- Maturity Level

- **0** No IT Architecture Program
- **1** Initial - Informal IT Architecture Process Underway
- **2** IT Architecture Process Is Under Development
- **3** Defined IT Architecture Including Detailed Written Procedures and TRM
- **4** Managed and Measured IT Architecture Process
- **5** Optimizing - Continuous Improvement of IT Architecture Process





# Table - DoC Enterprise Architecture Capability Maturity Model

## Section 1 - Department of Commerce IT Architecture Capability Maturity Model<sup>1</sup>

Revision 1.1

Level	Focus	Architecture Characteristics <sup>2</sup>
0	No IT Architecture Program	No IT Architecture to speak of.
1	<b>Initial</b> - Informal IT Architecture Process Underway	(1) <b>Processes are ad hoc and localized.</b> Some IT Architecture processes are defined. There is <b>no unified architecture process</b> across technologies or business processes. Success depends on individual efforts. (2) IT Architecture processes, documentation and standards are established by a variety of ad hoc means and are localized or informal. (3) Minimal, or implicit linkage to business strategies or business drivers. (4) Limited management team awareness or involvement in the architecture process. (5) Limited Operating Unit acceptance of the IT Architecture process. (6) The latest version of the Operating Unit's IT Architecture documentation is on the Web. Little communication exists about the IT Architecture process and possible process improvements. (7) IT Security considerations are ad hoc and localized. (8) No explicit governance of architectural standards. (9) Little or no involvement of strategic planning and acquisition personnel in enterprise architecture process. Little or no adherence to existing Standards Profile.
2	IT Architecture Process Is <b>Under Development</b>	(1) Basic IT Architecture Process program is documented based on OMB Circular A - 130 and Department of Commerce IT Architecture Guidance. The architecture process has developed clear roles and responsibilities. (2) <b>IT Vision, Principles, Business Linkages, Baseline, and Target Architecture are identified.</b> Architecture standards exist, but not necessarily linked to Target Architecture. <b>Technical Reference Model and Standards Profile framework established.</b> (3) Explicit linkage to business strategies. (4) Management awareness of Architecture effort. (5) Responsibilities are assigned and work is underway. (6) The DoC and Operating Unit IT Architecture Web Pages are updated periodically and is used to document architecture deliverables. (7) IT Security Architecture has defined clear roles and responsibilities. (8) Governance of a few architectural standards and some adherence to existing Standards Profile. (9) Little or no formal governance of IT Investment and Acquisition Strategy. Operating Unit demonstrates some adherence to existing Standards Profile.
3	<b>Defined</b> IT Architecture Including Detailed Written Procedures and Technical Reference Model	(1) The architecture is well defined and communicated to IT staff and business management with Operating Unit IT responsibilities. The process is largely followed. (2) <b>Gap Analysis and Migration Plan are completed. Fully developed Technical Reference Model and Standards Profile.</b> IT goals and methods are identified. The architecture aligns with the DoC and Federal Enterprise Architectures. (3) <b>IT Architecture is integrated with capital planning &amp; investment control and supports e-government.</b> (4) Senior-management team aware of and supportive of the enterprise-wide architecture process. Management actively supports architectural standards. (5) Most elements

<sup>1</sup>Meta Group, "Enterprise Process Maturity Model and the SEI Model", Enterprise Architecture Strategies, File 16, July 28, 1998

<sup>2</sup>Numbers correspond to IT Architecture Characteristics

# Table - DoC Enterprise Architecture Capability Maturity Model

Level	Focus	Architecture Characteristics <sup>2</sup>
		of Operating Unit show acceptance of or are actively participating in the IT Architecture process. (6) Architecture documents updated regularly on DoC IT Architecture Web Page. (7) IT Security Architecture Standards Profile is fully developed and is integrated with IT Architecture. (8) Explicit documented governance of majority IT investments. (9) IT acquisition strategy exists and includes compliance measures to IT Enterprise Architecture. Cost-benefits are considered in identifying projects.
4	<b>Managed</b> and Measured IT Architecture Process	(1) IT Architecture process is part of the culture. <b>Quality metrics associated with the architecture process are captured.</b> (2) IT Architecture documentation is <b>updated on a regular cycle</b> to reflect the updated IT Architecture. Business, Information, Application and Technical Architectures <b>defined by appropriate de-jure and de-facto standards.</b> The architecture continues alignment with the DoC and Federal Enterprise Architectures. An automated tool is used to improve the usability of the architecture. (3) Capital planning and investment control are adjusted based on the feedback received and lessons learned from updated IT Architecture. Periodic re-examination of business drivers. (4) Senior-management team directly involved in the architecture review process. (5) The entire Operating Unit accepts and actively participates in the IT Architecture process. (6) Architecture documents are updated regularly, and frequently reviewed for latest architecture developments/standards. (7) Performance metrics associated with IT Security Architecture are captured. (8) Explicit governance of all IT investments. Formal processes for managing variances feed back into IT Architecture. (9) All planned IT acquisitions and purchases are guided and governed by the IT Architecture.
5	<b>Optimizing</b> - Continuous Improvement of IT Architecture Process	(1) Concerted efforts to optimize and continuously improve architecture process. (2) A standards and waivers process are used to improve architecture development process improvements. (3) <b>Architecture process metrics are used to optimize and drive business linkages.</b> Business involved in the continuous process improvements of IT Architecture. (4) Senior management involvement in optimizing process improvements in Architecture development and governance. (5) Feedback on architecture process from all Operating Unit elements is <b>used to drive architecture process improvements.</b> (6) <b>Architecture documents are used by every decision maker in the organization for every IT-related business decision.</b> (7) Feedback from IT Security Architecture metrics are used to drive architecture process improvements. (8) Explicit governance of all IT investments. A standards and waivers process is used to improve governance-process improvements. (9) No unplanned IT investment or acquisition activity.

## Characteristics of DoC Operating Units' Enterprise Architecture Processes at Different Maturity Levels<sup>1</sup>

1. **Architecture Process:** Is there an established IT Architecture process?
2. **Architecture Development:** To what extent is the development and progression of the Operating Units' IT Architecture documented?
3. **Business Linkage:** To what extent is the IT Architecture linked to business strategies or drivers?
4. **Senior Management Involvement:** To what extent are the senior managers of the Operating Unit involved in the establishment and ongoing development of an IT Architecture?

<sup>1</sup>Meta Group, "Enterprise Process Maturity Model and the SEI Model", Enterprise Architecture Strategies, File 16, July 28, 1998



## Characteristics of DoC Operating Units' IT Architecture Processes at Different Maturity Levels<sup>1</sup>

- 5A. Operating Unit Participation: **To what extent is the IT Architecture process accepted by the Operating Unit?**
- 5B. Operating Unit Participation: **To what extent is the IT Architecture process an effort representative of the whole organization?**
- 6A. Architecture Communication: **To what extent are the decisions of IT Architecture practice documented?**
- 6B. Architecture Communication: **To what extent is the content of the IT Architecture made available electronically to everybody in the organization?**
- 6C. Architecture Communication: **To what extent is architecture education done across the business on the IT Architecture process and contents?**

<sup>1</sup>Meta Group, "Enterprise Process Maturity Model and the SEI Model", Enterprise Architecture Strategies, File 16, July 28, 1998



## Characteristics of DoC Operating Units' Enterprise Architecture Processes at Different Maturity Levels<sup>1</sup>

7. IT Security: **To what extent is IT Security integrated with the IT Architecture?**
8. Governance: **To what extent is an IT Architecture governance (governing body) process in place and accepted by senior management ?**
9. IT Investment and Acquisition Strategy: **To what extent does the Enterprise Architecture influence the IT Investment and Acquisition Strategy?**

<sup>1</sup>Meta Group, “Enterprise Process Maturity Model and the SEI Model”, Enterprise Architecture Strategies, File 16, July 28, 1998





# NOAA IT EA Capability Maturity Model Scorecard - FY 2003

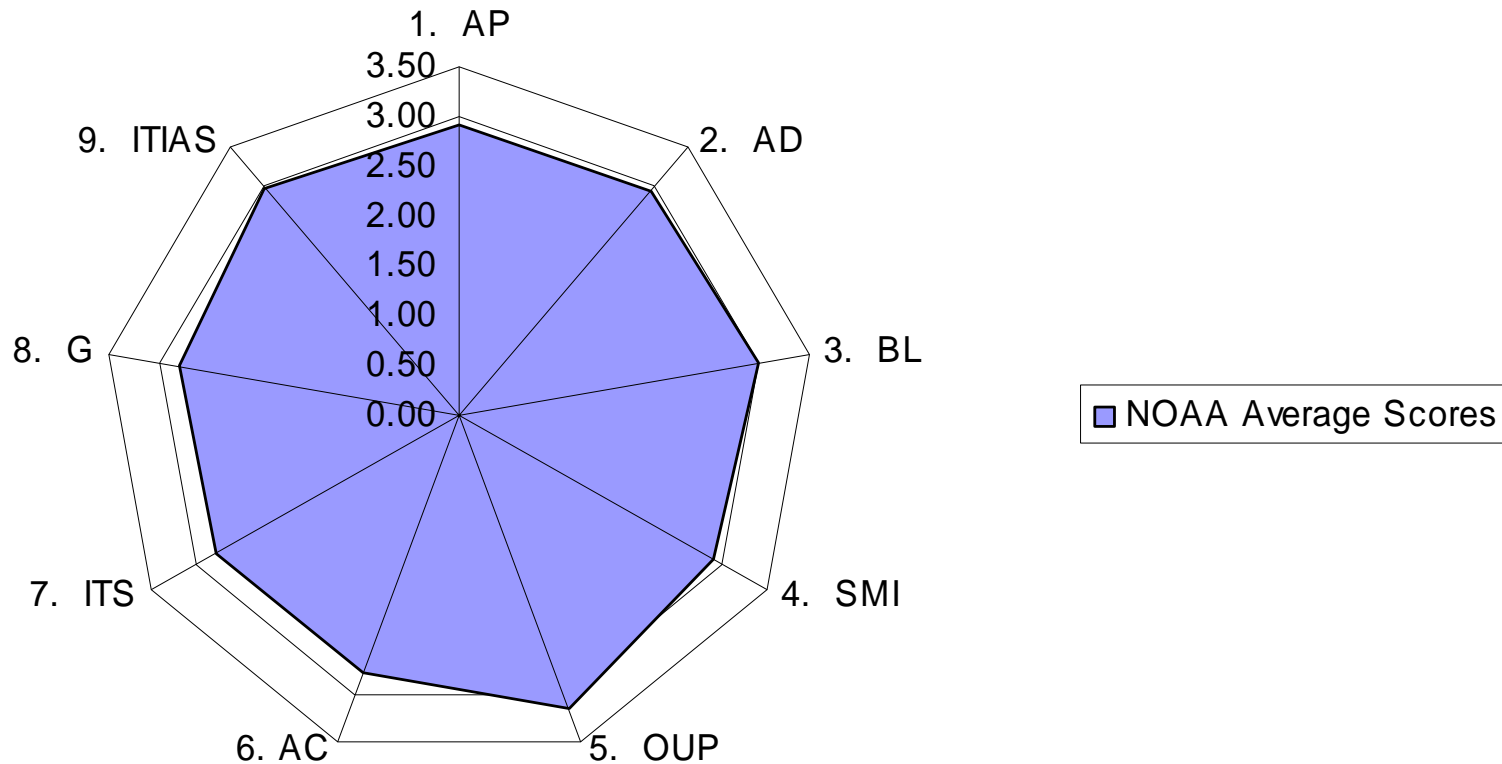
1. Architecture Process	2.93
2. Architecture Development	2.95
3. Business Linkage	2.99
4. Senior Management Involvement	2.90
5A. Operating Unit Participation	3.21
5B. Operating Unit Participation	3.04
5. Average Operating Unit Participation	3.13
6A. Architecture Communication	2.73
6B. Architecture Communication	2.73
6C. Architecture Communication	2.55
6. Average Architecture Communication	2.75
7. IT Security	2.74
8. Governance:	2.80
9. IT Investment and Acquisition Strategy	2.98
<b>IT Architecture Capability Maturity Score</b>	<b>2.91</b>



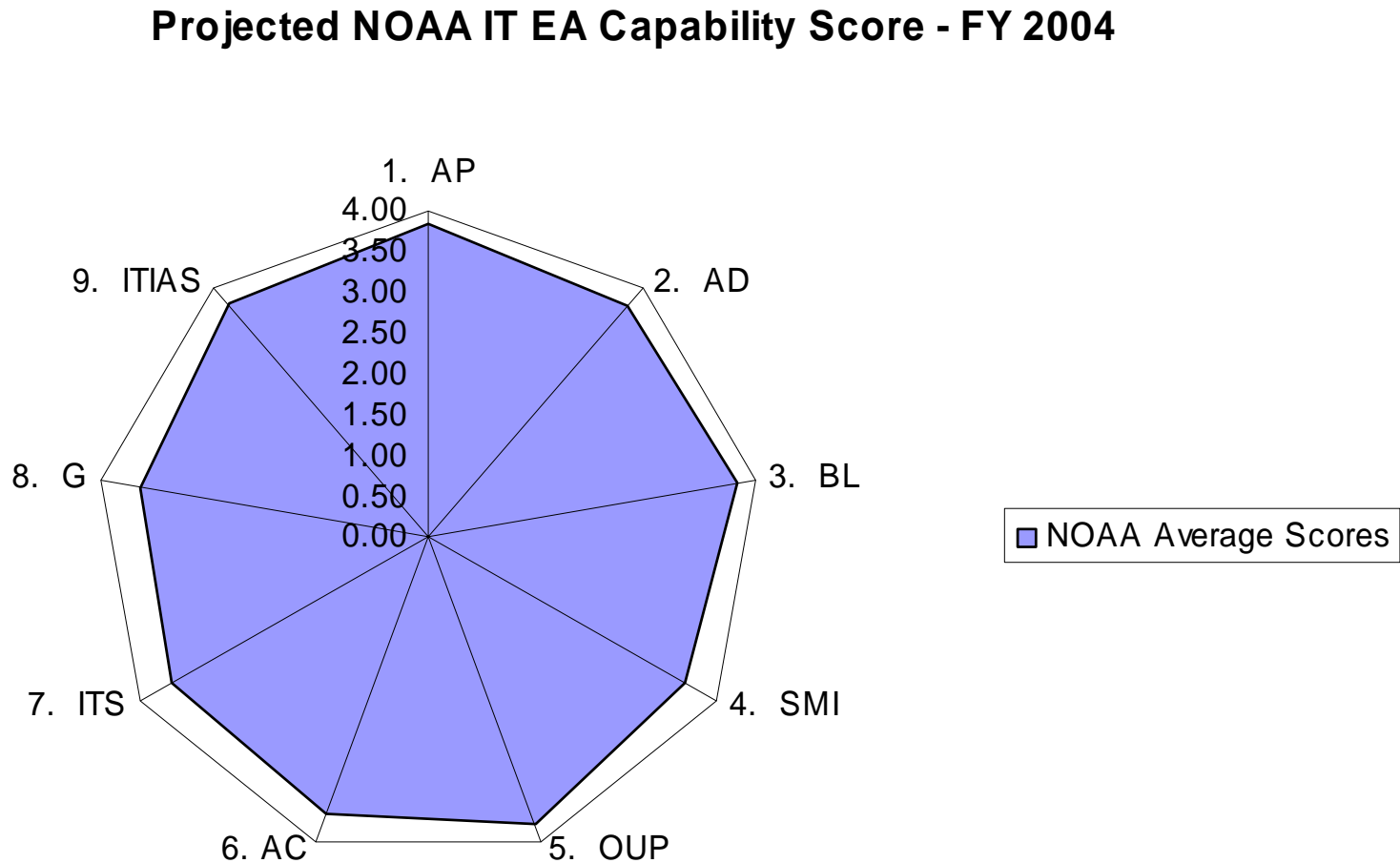


## NOAA IT EA Capability Maturity Model Score - FY 2003

NOAA IT EA Capability Maturity Score - FY 2003



## NOAA IT EA Capability Maturity Model Score - FY 2004



United States General Accounting Office

GAO

Report to Congressional Requesters

November 2003

## INFORMATION TECHNOLOGY

### Leadership Remains Key to Agencies Making Progress on Enterprise Architecture Efforts



G A O

Accountability • Integrity • Reliability

GAO-04-40

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Appendix V  
Detailed Comparison of Individual  
Department Responses against Our EA  
Management Maturity Framework

## Department of Commerce

The Department of Commerce provided its 2001 survey responses on June 29, 2001, and its 2003 responses on April 18, 2003.

**Table 31: Comparison of Maturity Assessments in 2001 and 2003 (According to Framework Version 1.0): Department of Commerce**

Stage	Element	Satisfied?	
		2001 results	2003 results
Stage 1: Creating EA awareness	Agency is aware of EA.	Yes	Yes
Stage 2: Building the EA management foundation	Committee or group representing the enterprise is responsible for directing, overseeing, and/or approving EA.	Yes	Yes
	Program office responsible for EA development exists.	Yes	No
	Chief architect exists.	Yes	Yes
	EA being developed using a framework and automated tool.	Yes	Yes
	EA plans call for describing enterprise in terms of business, data, applications, or technology.	Yes	Yes
	EA plans call for describing "as is" environment, "to be" environment, or sequencing plan.	Yes	Yes
Stage 3: Developing architecture products	Written/approved policy exists for EA development.	Yes	Yes
	EA products are under configuration management.	Yes	Yes
	EA products describe or will describe enterprise's business—and the data, applications, and technology that support it.	Yes	Yes
	EA products describe or will describe "as is" environment, "to be" environment, and sequencing plan.	Yes	Yes
	EA scope is enterprise-focused.	Yes	Yes
Stage 4: Completing architecture products	Written/approved policy exists for information technology investment compliance with EA.	Yes	Yes
	EA products describe enterprise's business—and the data, applications, and technology that support it.	No	No
	EA products describe "as is" environment, "to be" environment, and sequencing plan.	Yes	No
	Agency chief information officer has approved EA.	Yes	Yes
Stage 5: Leveraging the EA for managing change	Written/approved policy exists for EA maintenance.	Yes	Yes
	Either EA steering committee, investment review board, or agency head has approved EA.	Yes	Yes
	Metrics exist for measuring EA benefits.	Yes	No
Overall maturity stage		Stage 3	Stage 1

Source: GAO, agency data.

Note: Each stage includes all elements of previous stages.



Table 32: Maturity Assessment in 2003 (According to Framework Version 1.1): Department of Commerce

Stage	Element	Satisfied?
Stage 1: Creating EA awareness	—	Yes
Stage 2: Building the EA management foundation	Adequate resources exist.	Yes
	Committee or group representing the enterprise is responsible for directing, overseeing, or approving EA.	Yes
	Program office responsible for EA development and maintenance exists.	No
	Chief architect exists.	Yes
	EA is being developed using a framework, methodology, and automated tool.	Yes
	EA plans call for describing both "as-is" and "to-be" environments of the enterprise, as well as a sequencing plan for transitioning from the "as-is" to the "to-be."	Yes
	EA plans call for describing both "as-is" and "to-be" environments in terms of business, performance, information/data, application/service, and technology.	Yes
	EA plans call for business, performance, information/data, application/service, and technology descriptions to address security.	Yes
Stage 3: Developing architecture products	EA plans call for developing metrics for measuring EA progress, quality, compliance, and return on investment.	Yes
	Written and approved organization policy exists for EA development.	Yes
	EA products are under configuration management.	Yes
	EA products describe or will describe both "as-is" and "to-be" environments, as well as a sequencing plan.	Yes
	Both "as-is" and "to-be" environments are described or will be described in terms given in Stage 2.	Yes
	These descriptions address or will address security.	Yes
Stage 4: Completing architecture products	Progress against EA plans is measured and reported.	Yes
	Written and approved organization policy exists for EA maintenance.	Yes
	EA products and management processes undergo independent verification and validation.	No
	EA products describe both "as-is" and "to-be" environments, as well as a sequencing plan.	Yes
	Both "as-is" and "to-be" environments are described in terms given in Stage 2.	No
	These descriptions address security.	Yes
	Organization CIO has approved current version of EA.	Yes
	Committee or group representing the enterprise or the investment review board has approved current version of EA.	Yes
	Quality of EA products is measured and reported.	Yes



Appendix V  
Detailed Comparison of Individual  
Department Responses against Our EA  
Management Maturity Framework

(Continued From Previous Page)

Stage	Element	Satisfied?
Stage 5: Leveraging the EA for managing change	Written and approved organization policy exists for IT investment compliance with EA.	Yes
	Process exists to formally manage EA change.	No
	EA is integral component of IT investment management process.	Yes
	EA products are periodically updated.	Yes
	IT investments comply with EA.	Yes
	Organization head has approved current version of EA.	No
	Return on EA investment is measured and reported.	No
	Compliance with EA is measured and reported.	No
Overall maturity stage		Stage 1

Source: GAO, agency data.

Note: Each stage includes all elements of previous stages.



## Excerpts from GAO Report

- Page 91: **Two of these agencies, Commerce and the U.S. Mint,** could advance two stages by satisfying just 1 additional core element.
- **Commerce, currently a Stage 1 agency, could advance to Stage 3 by satisfying the framework element** “Program office responsible for development and maintenance exists.”
- Page 92: **Conversely, the Departments of Commerce, Justice, and the Treasury were at Stage 1, with their component agencies averaging higher maturity levels. Component agencies of Commerce showed a slightly higher maturity level than did component agencies of other departments.**
- **Although the average maturity level** of the 56 department component agencies we surveyed was 1.23, the five Commerce component agencies showed an average maturity level of 1.80, **largely owing to the maturity levels for the Bureau of the Census (Stage 3), the U.S. Patent and Trademark Office (Stage 2), and the National Oceanic and Atmospheric Administration (Stage 2).**





## Independent Validation and Verification

### Goals of the IV&V

- To assess the progress of the Operating Units in developing and managing their Enterprise IT Architecture programs
- To evaluate the accuracy of the Operating Unit self assessments
- To determine the adequacy of the Capability Maturity Model (CMM) as a measurement tool for Enterprise IT Architecture development



## Independent Validation and Verification

### IV&V Process

- Review team composed of members of the Advisory Group
- Evaluated the CMM and the Self Assessment submittal for each Operating Unit
- Interview CIOs, Architects and others from each Operating Unit
- Gather information about progress
- Develop written evaluation on findings for each Operating Unit
- Meet with each Operating Unit to debrief the findings



## Independent Validation and Verification

### Preliminary IT Findings

- **Most Operating Units** self assessments were scored accurately or conservatively
- **Approximately 80 percent had documented Enterprise IT Architectures**
- **Significant progress has been made since September 2003**
- Many Operating Units are actively developing Enterprise IT Architectures with EA Visualization Modeling Tool
- **Some Operating Units have lost IT Architecture resources or staff to other resource priorities.**



## Independent Validation and Verification

### Preliminary Management Findings

- EA Visualization Modeling tool not viewed as really valuable outside CIO areas
- Most upper management **is not fully committed to Enterprise IT Architecture**. Don't see it as producing good return.
- Architecture still viewed as having little business application **by upper management (non – CIO community)**



## Outline

- Communication
- **Consensus Building**
- Collaboration
- Cooperation



## Case Studies: Practical Strategies to Integrate Agency Management Processes EA and CPIC

- “...officials noted that there were a number of dedicated, interested staff who made it their personal mission to develop an EA and integrate it into the CPIC process. This allowed important relationships to develop across component organizations in the Department, and in the CIO, CFO, acquisition, and budget offices.”



## Consensus Building – Department of Commerce Enterprise IT Architecture Governance and History





## In the Beginning: DoC IT Architecture Efforts

- **Ad-hoc pockets of excellence existed throughout the Department**
- **Some organizations had done extensive IT Architecture work**
- **Some organizations had done none**
- **Mix between in-house development and working with outside contractors**
- **For those EAs developed or underway, scope and effort matched the guidance from the Federal Enterprise Architecture Conceptual Framework**



## Timeline of DoC Enterprise IT Architecture Efforts

- March 1994 – GAO Report AIMD-94-28 Systems Architecture Needed for NWS Modernization
- March 1995 – NOAA Deputy Administrator Diana Josephson requests NOAA Systems Acquisition Office Systems Engineering Staff to assist NOAA Line Offices develop IT Architectures
- June 1995 – NWS and Systems Engineering Staff begin development of NWS IT Architecture
- July 1996 – NOAA Fisheries IT Architecture Kick-Off Meeting
- October 1998 – Bureau of Census develops Enterprise IT Architecture Baseline
- November 1998 – CIO authorized creation of IT Architecture Affinity Group
- January 1999 – DOC IT Architecture Affinity Group meets for first time



## Timeline of DoC Enterprise IT Architecture Efforts (Continued)

- March 1999 - **Presented recommendations to CIO Council**
- August 1999 – **IT Architecture Guidance issued**
- October 1999 – **IT Architecture documents sent to DOC IT Architecture Affinity Group for review for first time**
- January 2000 – **IT Architecture Training Seminars for NOAA Staff held in Silver Spring, MD and in Boulder, CO given by META Group**
- June 2000 – **Updated IT Architecture Documents sent to IT Architecture Affinity Group**
- December 2000 – **Released Version 1.0 of Dept. of Commerce Architecture Capability Maturity Model**
- December 2000 - **IT Architecture Affinity Group recognized by receiving DOC Bronze Medal Award for creating and implementing the Department's IT Architecture**

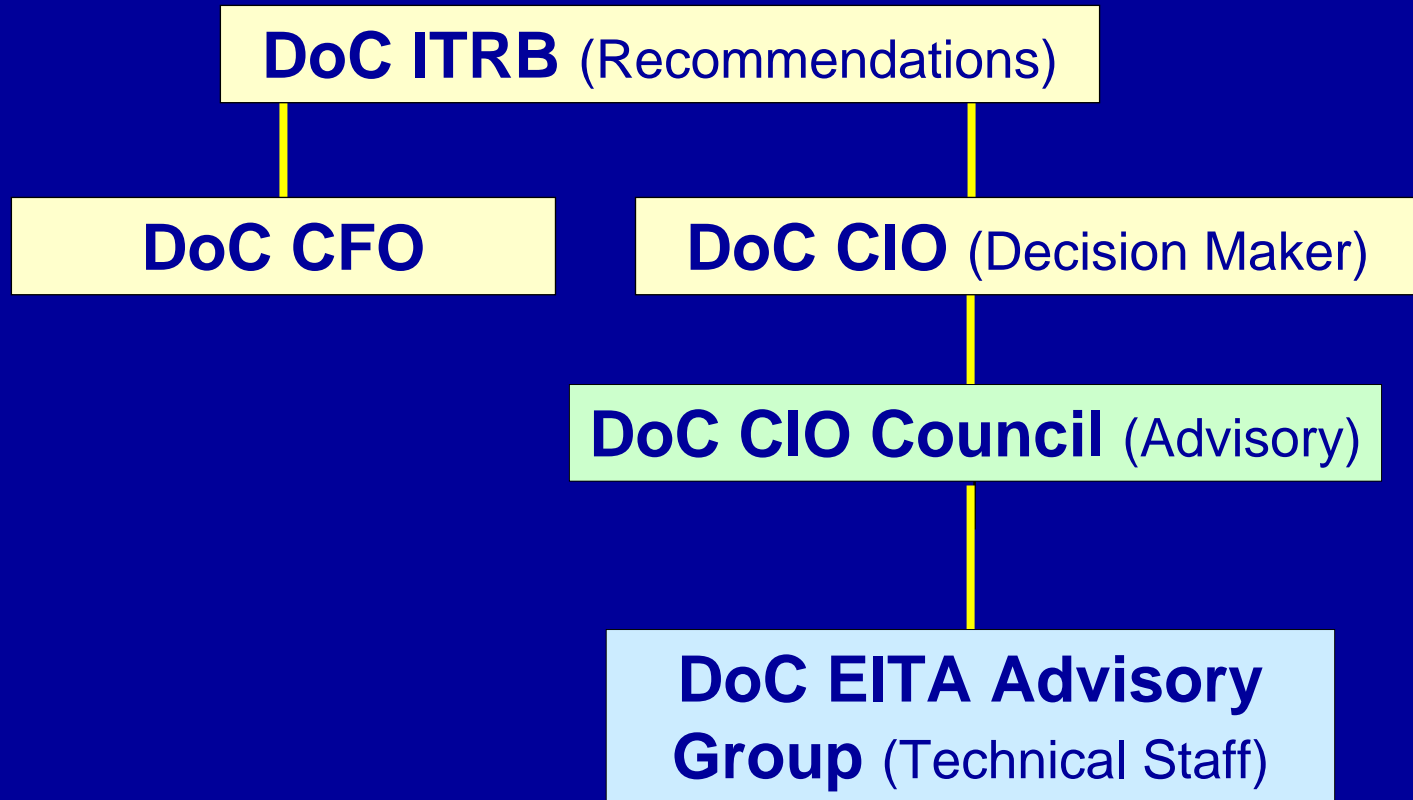


## Timeline of DoC Enterprise IT Architecture Efforts (Continued)

- August 2001 – **Operating Unit Enterprise Architecture Capability Maturity** scorecard results sent to Dept. OCIO for first time
- April 2002 – Released Version 2.0 of Dept. of Commerce **Architecture Capability Maturity Model**
- June 2002 – Bureau of Census Releases Enterprise Architecture Tools and Templates Study
- July 2002 – **Began market research for Enterprise Architecture modeling software that could be used Department-wide**
- April 2003 - Negotiated BPA that is available to all of DOC for Enterprise Architecture Modeling Software
- December 2003 – **Rechartered as DoC Enterprise IT Architecture Advisory Group**
- April 2004 – **Held NOAA EA Visualization Model Workshop**



## DoC IT Governance Structure



## DoC Enterprise IT Architecture Advisory Group Charter

- **Make recommendations** and provide advice to the DoC CIO and the CIO Council with respect to policy, procedures, and standards related to the maintenance and update of the Enterprise IT Architecture.
- **Review all Operating Unit Enterprise Architectures** and provide recommendations through the CIO to the operating unit CIOs.
- **Manage development and acquisition of a unified EITA management system tool** for DoC and promote its use throughout the DoC, as specified in the DoC Technical Reference Model (TRM).
- **Coordinate the interface** between the Department's EITA management system tool and OMB's Federal Enterprise IT Architecture and the related five Reference Models (Business, Service Component, Technical, Performance, and Data).
- **Share** experiences, ideas, and promising practices among Advisory Group members and the CIO community at large.



## DoC IT Architecture Affinity Group/DoC Enterprise IT Architecture Advisory Group

- Meets every other Tuesday morning for 90 minutes
- Developed DoC IT Architecture Guidance Documents and Evaluation Checklist
- Created DoC IT Architecture Capability Maturity Model
- Provide guidance on and review all Operating Unit Enterprise Architectures
- Peer review of annual Enterprise Architecture updates
- Integrating Department-wide implementation of Commerce EA modeling toolset application





## Outline

- Communication
- Consensus Building
- Collaboration
- Cooperation



## Case Studies: Practical Strategies to Integrate Agency Management Processes EA and CPIC

- “...officials stressed that they heavily leverage and use all existing resources within their department and externally to make progress on the EA without a significant EA budget. The notion of using a single approach multiple times (1) ensures consistency across agencies and (2) reduces the amount of duplicative resources working to solve the same problem. Agency B officials noted that a key precept of their EA practice is to “develop once, use many.”



## Enterprise IT Architecture Modeling - Develop Once, Use Many



## Steps in Planning and Developing an Enterprise Knowledge Model

- **Develop the model purpose definition and business questions that the model will be expected to answer**
  - Top five lessons learned
- **Using the pre-defined meta model template, develop entity relationship diagrams**
- **Develop a gap analysis to determine if and what Meta model additions are needed to support the model purpose and business questions**
- **Develop a model structure to visually layout the model contents**



## Steps in Planning and Developing an Enterprise knowledge Model

- Determine what pre-defined Meta model template will best support the model purpose.
- If needed, augment the pre-defined metamodel template with additional or modified objects, properties, and relationships, based on the gap analysis performed
- Develop Analytics to perform queries that address the business questions the model is developed to support
- Develop Reporting and Dash boarding to present results from model Analytics
- Develop Model and Meta model Governance and Distribution Procedures



## Model Population Planning

**Based on user requirements, answer these questions:**

- What information is needed?
- Where does this information come from?
- How is the information maintained and linked together?
- Who is responsible for maintaining the information?
- When does the information change?
- Will the data stay at it's original source?
- Classify data as manual or automated.



# HPC Business Questions Gap Analysis

Priority (1 -3)	Business Area	Business Question	Value	Meta Model Objects To Support	HPC Meta modeling needs
1	<u>Business Direction:</u>	What are the NOAA High Performance Computing (HPC) requirements by category and how are they satisfied?		<u>Analysis Domain:</u> Requirement Object <u>Strategy &amp; Rule Domain:</u> Business Capability <u>IT Architecture Domain:</u> Design Rule	Relationship between Requirement and Business Capability. Relationship between Business Capability and Design Rule.
2		What new capabilities are needed to support future business requirements		<u>Analysis Domain:</u> Requirement Object <u>Strategy &amp; Rule Domain:</u> Business Capability <u>Product Domain:</u> Product Service <u>IT Technology Physical Domain:</u> Compute Objects	Relationship between product, service to Compute Objects with future capability requirements added to relationships
1		What NOAA mission goals are supported by which HPC products and services? And which HPC resources are required to produce these?		<u>Strategy &amp; Rule Domain:</u> Goal Object Business Capability <u>Product Domain:</u> Product Service <u>IT Technology Physical Domain:</u> Compute Objects	Relationship between Service and Capability Relationship between product, service and compute objects
1		What NOAA goals are not met by HPC resources and What HPC resources are not supporting a goal?		<u>Strategy &amp; Rule Domain:</u> Goal Object <u>Business Capability</u> <u>Product Domain:</u> Product Service	





# HPC Business Direction Analysis

## Business Direction

HPC Navigation View

Requirements

HPC resources supporting  
programs

Capabilities

Goals To HPC Resources

Goals Not Met by HPC  
Resources

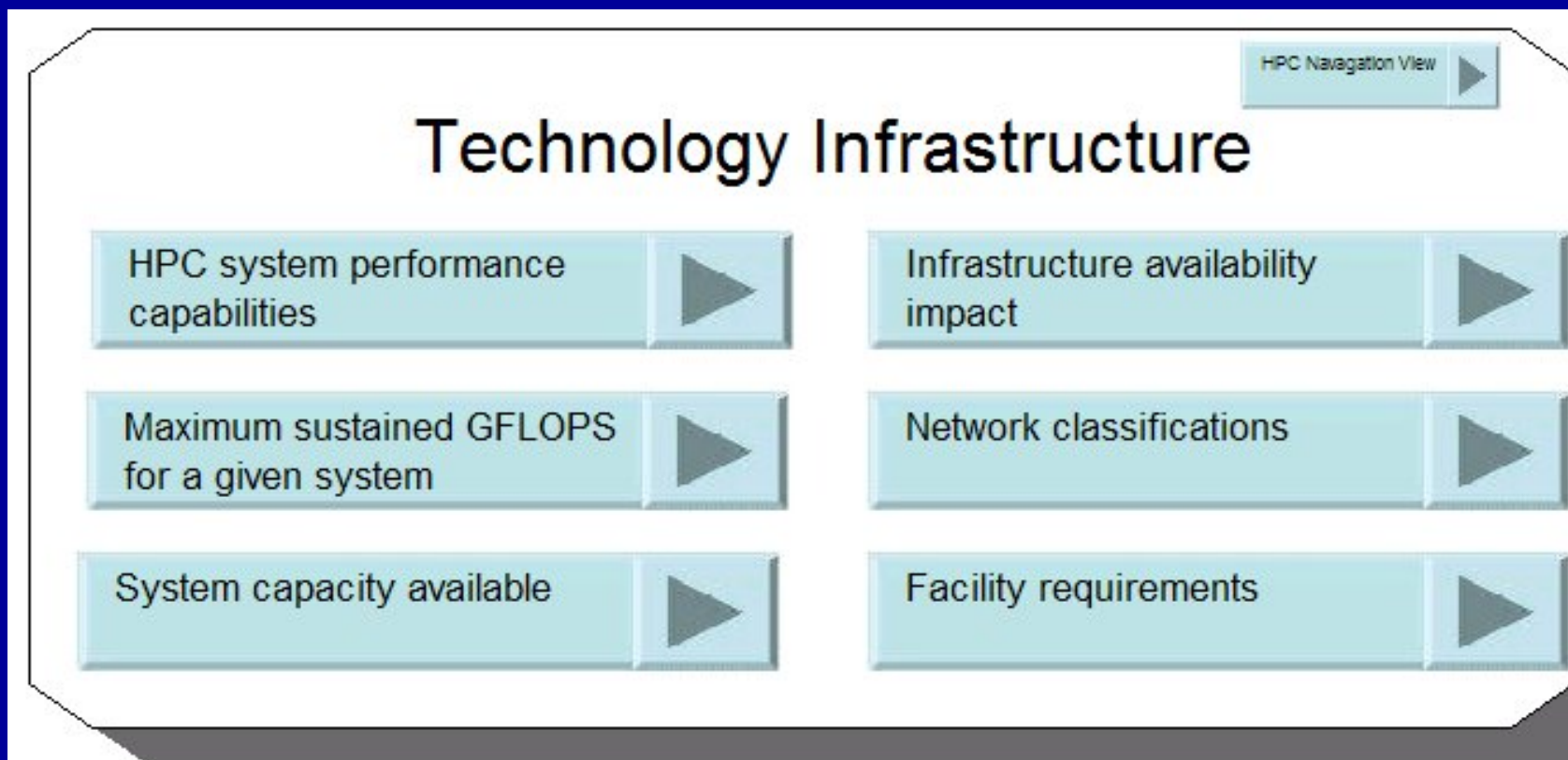
Strategic Plans supported by  
HPC partners

HPC Capabilities Aligned to  
FEA Reference Models

External partners /  
collaborators

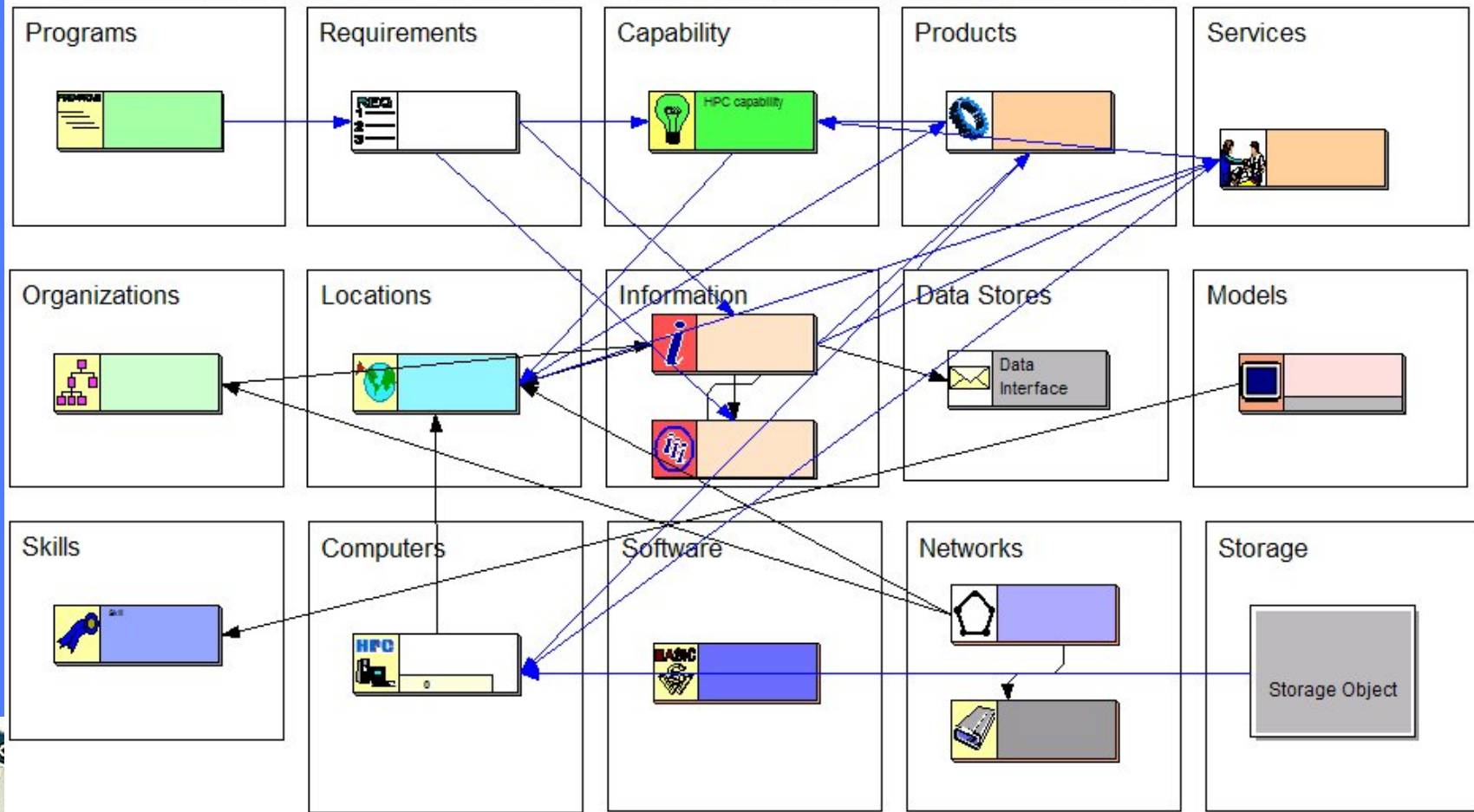


## HPC Technology Infrastructure Analysis



Create an entity relationship diagram for each question.  
Below is the diagram to support the question for  
“Capability Needs”

What capabilities are needed to support program requirements



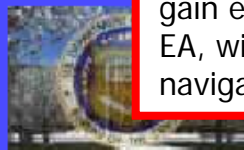
# Business questions being answered

**Our Tools Analysis included a set of Census Business Questions to be answered. Some examples of these include ...**

<b>Business Question</b>	<b>Decision Support Model View(s)</b>	<b>Objects in view</b>
<b>Which system support components should be upgraded or modernized?</b>	<b>Baseline, Transition Planning</b>	<b>Infrastructure, Business Process, Node Connectivity, System Interface, Stds Profile</b>
<b>What impact would a sudden budget change (surplus or deficit) have on funded programs or projects?</b>	<b>IT Business Plan, Baseline Architecture, Transition Planning</b>	<b>ITBP, Strategic Goal, Essential Elements<sup>[1]</sup></b>
<b>How do we communicate the enterprise standards, models, and processes to our internal and external customers?</b>	<b>Standards - Infrastructure, Application, Data, Security</b>	<b>TRM, Standards Profile</b>
<b>How do we identify process touchpoints and analyze the information flow across those intersections.</b>	<b>Organizational, Functional, Architecture Process - Review</b>	<b>Node Connectivity Diagram, Business Process Diagram</b>
<b>What is the impact of an internal change in a core business function on applications, infrastructure, and organizations?</b>	<b>Functional, Infrastructure</b>	<b>Business Process Diagram, System Interface Description, Organization Chart</b>

## EA Tool – Example Welcome Screen

The Census Enterprise Architecture Welcome screen offers users to gain education and background on EA, with links to online documents, navigation help and EA contacts.



### Enterprise Architecture Vision

- Support the core business of the Bureau Function as a strategic resource
- Align business and technology
- Leverage shared assets
- Build internal and external partnerships
- Optimize the value of IT services

### Welcome to the Census Enterprise Architecture



From this page you can navigate to information contained in the Census Enterprise Architecture. To learn more about our program or review some basic EA concepts, check out our online documents. If you're new to our architecture model, click on the reader's roadmap to learn what areas will help you get the answers you're looking for. Or if you prefer, you can navigate directly to the model using the quick links below.

The EA Welcome screen also offers Quick Links into the architecture information. The following screen shows the "Readers Roadmap".

#### Online Documents

- Census Enterprise Architecture Overview
- Enterprise Architecture Primer
- EA Reference Documents
- Communications
- Navigation Help
- Census EA Contacts

#### Quick Links

- Reader's Roadmap
- Census Enterprise Architecture: main view
- Strategic Planning
- Capital Asset Planning
- Major Initiatives
- Standards and Uniform Products





# Census EA (Reader's Roadmap)

Click to navigate to view

CEAF View

Welcome Page

## Reader's Roadmap

### Executive Views

#### Executive Summary Focus

Navigate through the model using these links to open high level views of the enterprise. Key areas are Strategic Plans, Business Cases, Major Initiatives, and Project Status

Census EA Overview

Target Initiatives

Strategic Planning

Business and Technology Drivers

Policies and Procedures

### Business Views

#### Business and Program Focus

These views are centered around the business function and processes of the Bureau

Decennial Model View

Economic Model View

Demographic Model View

Geography Model View

CAS

### Manager Views

#### Project and Initiative Focus

Open views of the model related to specific views of projects and initiatives.

FEA Reference Model Alignment

IT Business Plans

Reference Documents

Security Planning

### Technical Views

#### Designers and Developer Focus

Drill into Standards, technical reference, infrastructure and metadata views of the architecture.

Federal Reference Models

EA Principles

Infrastructure Target

Technical Reference Model

Information Architecture

### Operational Views

#### Compliance

Zoom to uniform products and standards, enterprise wide models, and compliance related processes.

Census Enterprise Architecture Framework

IT Services Model View

Reference Documents

Standards and Uniform Products

Priority Projects

### Partner Views

View our reference materials, reference models, and governance processes with these links.

Internal / External Organization

Product Compliance

Reference Documents

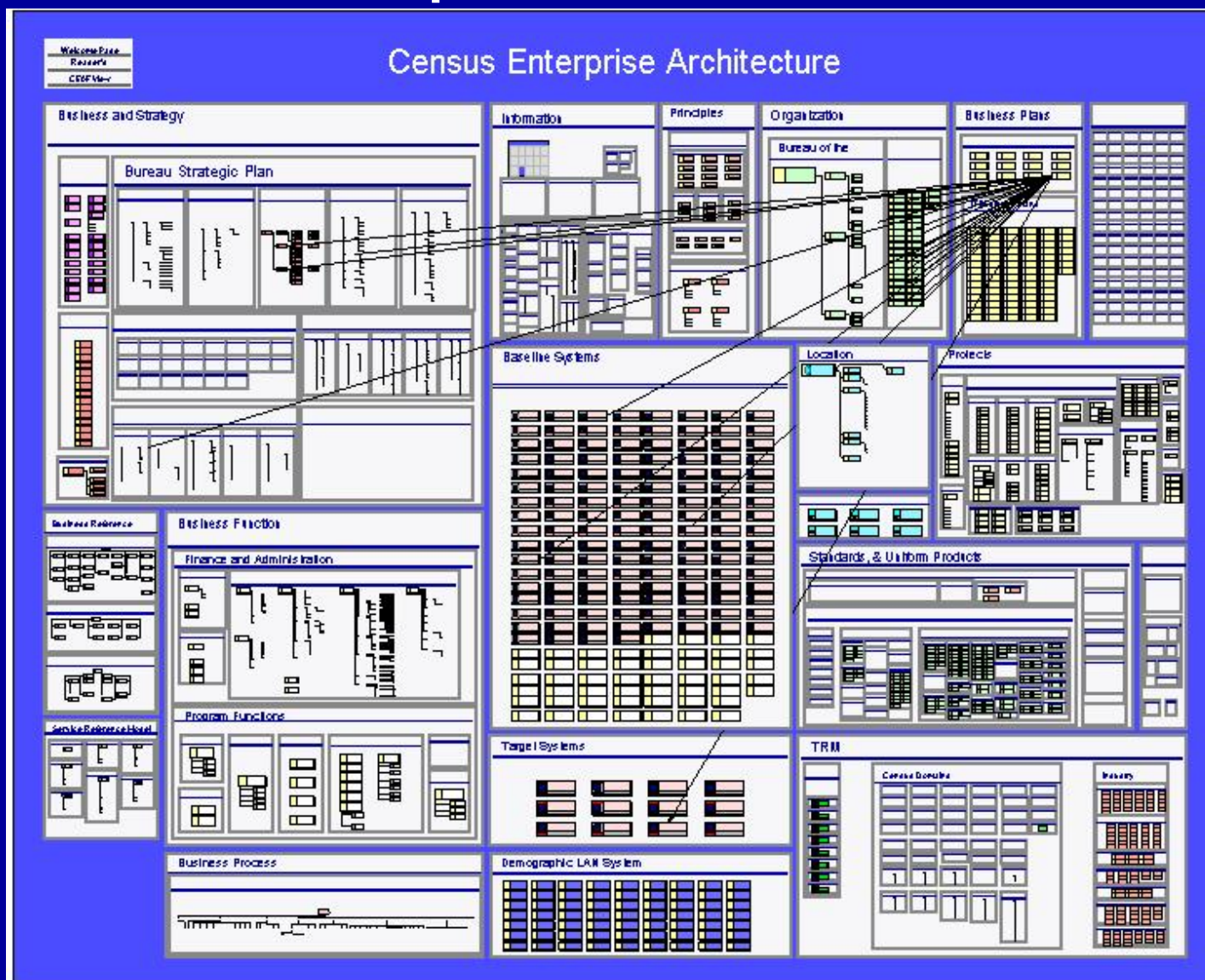
Census EA Contacts

Navigation Help

**The Reader's Roadmap provides links into the model organized by audience interest.** Let's take a look at the Strategic Planning view offered within the Executive portion of the roadmap ...

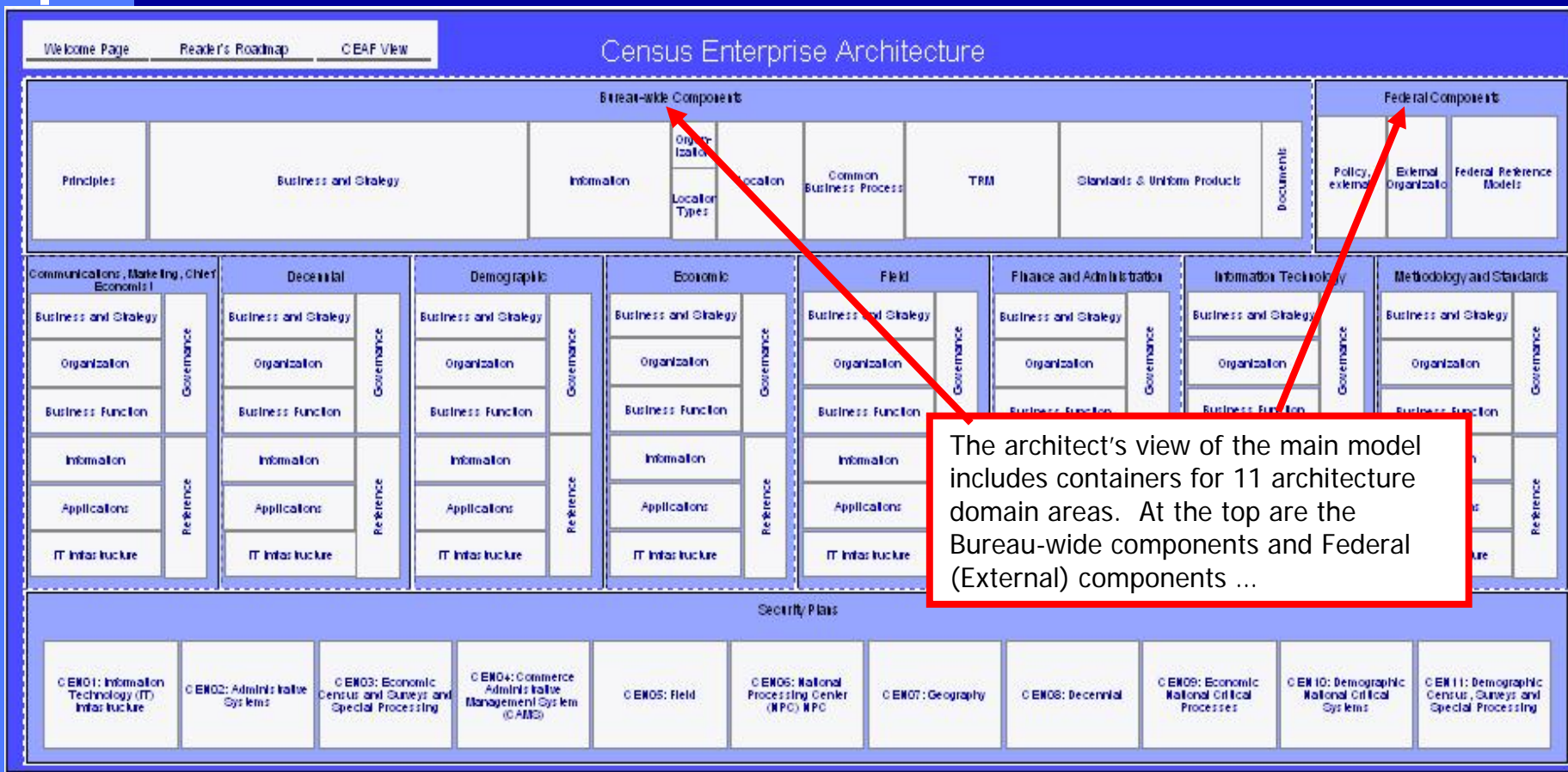


## EA Tool – Open Containers – Business Plan





# Census EA – EA Object Containers



A user can click on any or all of these containers to open up the detail views and in depth information.

Initiatives that may have once been viewed in isolation are now presented in a manner that reveals interaction with other initiatives, people, and processes throughout the organization.



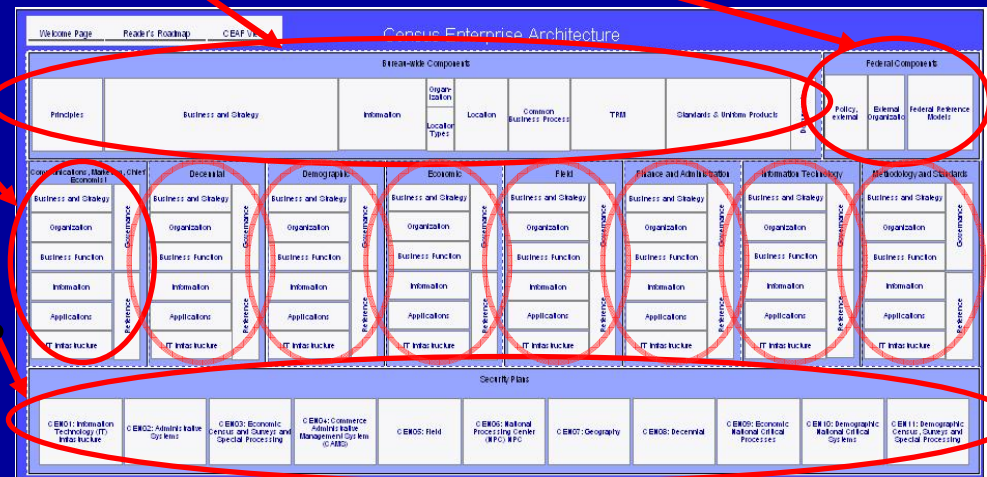
# Federated Approach: Model Implementation



Strategic level elements translate to bureau-wide + federal components

Operational architectures are linked via the management model. Often built in different tools.

Management level elements translate to domain architectures

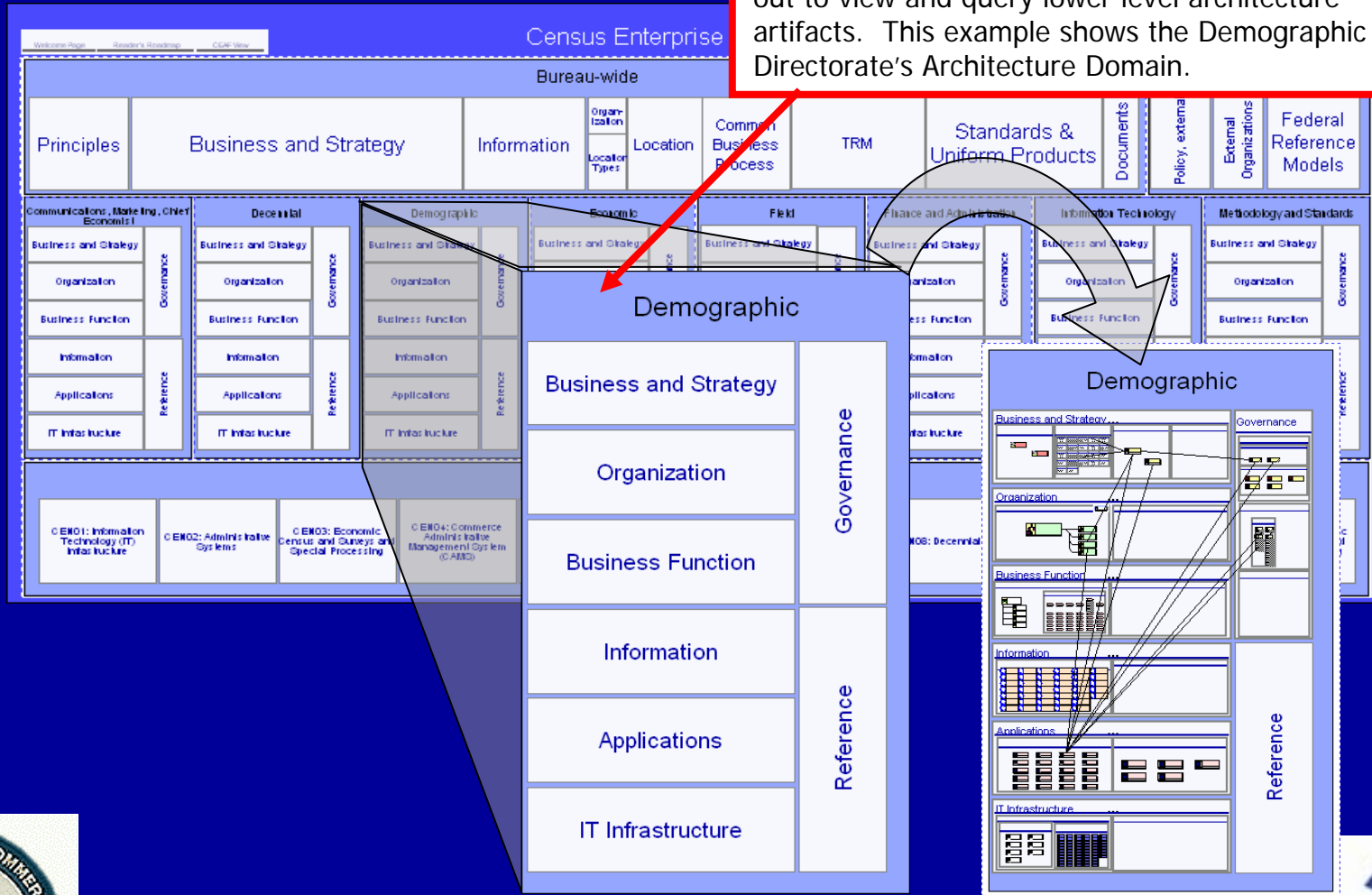


The submodels have been determined by data custodian; this model view represents that context



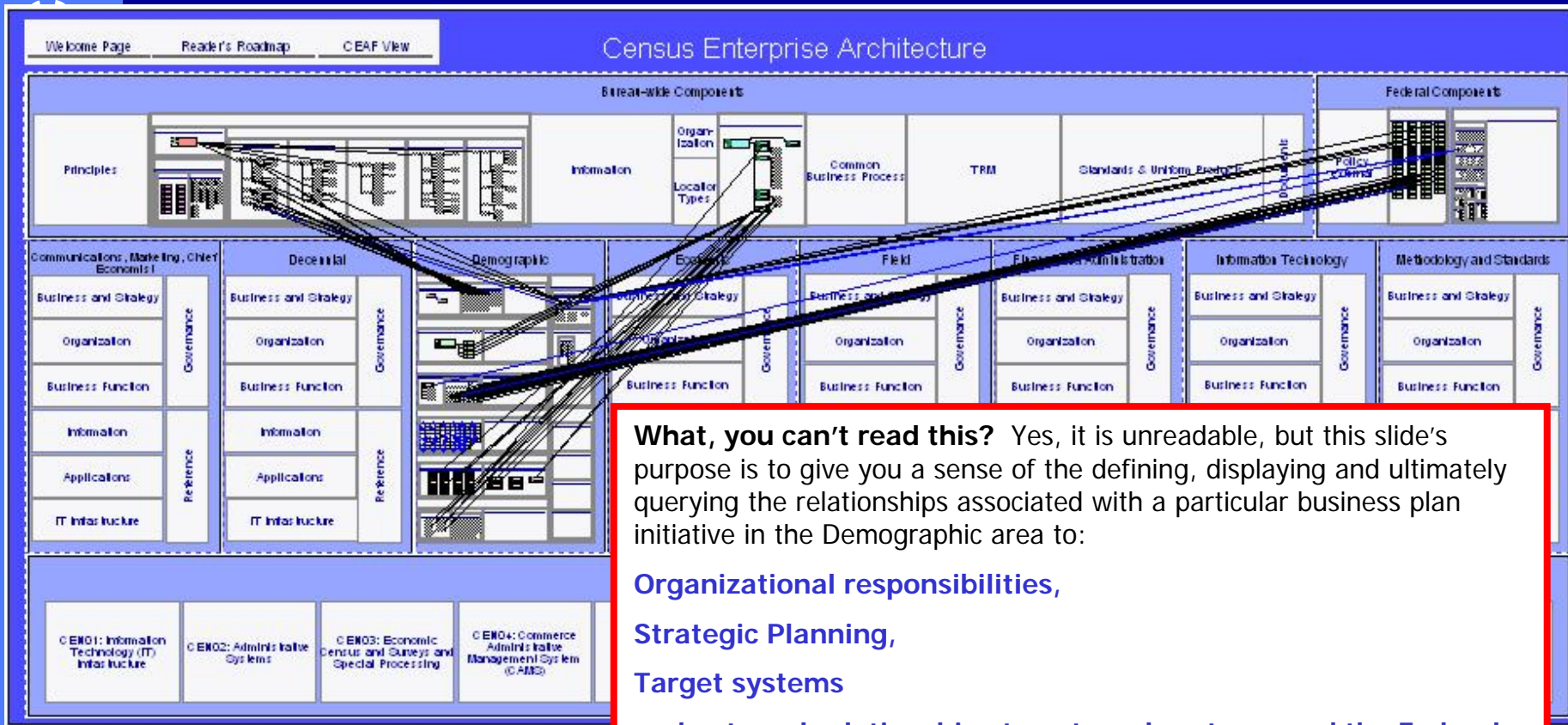
## Model Drill Down

Each user area domain architecture can be exploded out to view and query lower level architecture artifacts. This example shows the Demographic Directorate's Architecture Domain.





# Census EA – Full Architect View



**What, you can't read this?** Yes, it is unreadable, but this slide's purpose is to give you a sense of the defining, displaying and ultimately querying the relationships associated with a particular business plan initiative in the Demographic area to:

**Organizational responsibilities,**

**Strategic Planning,**

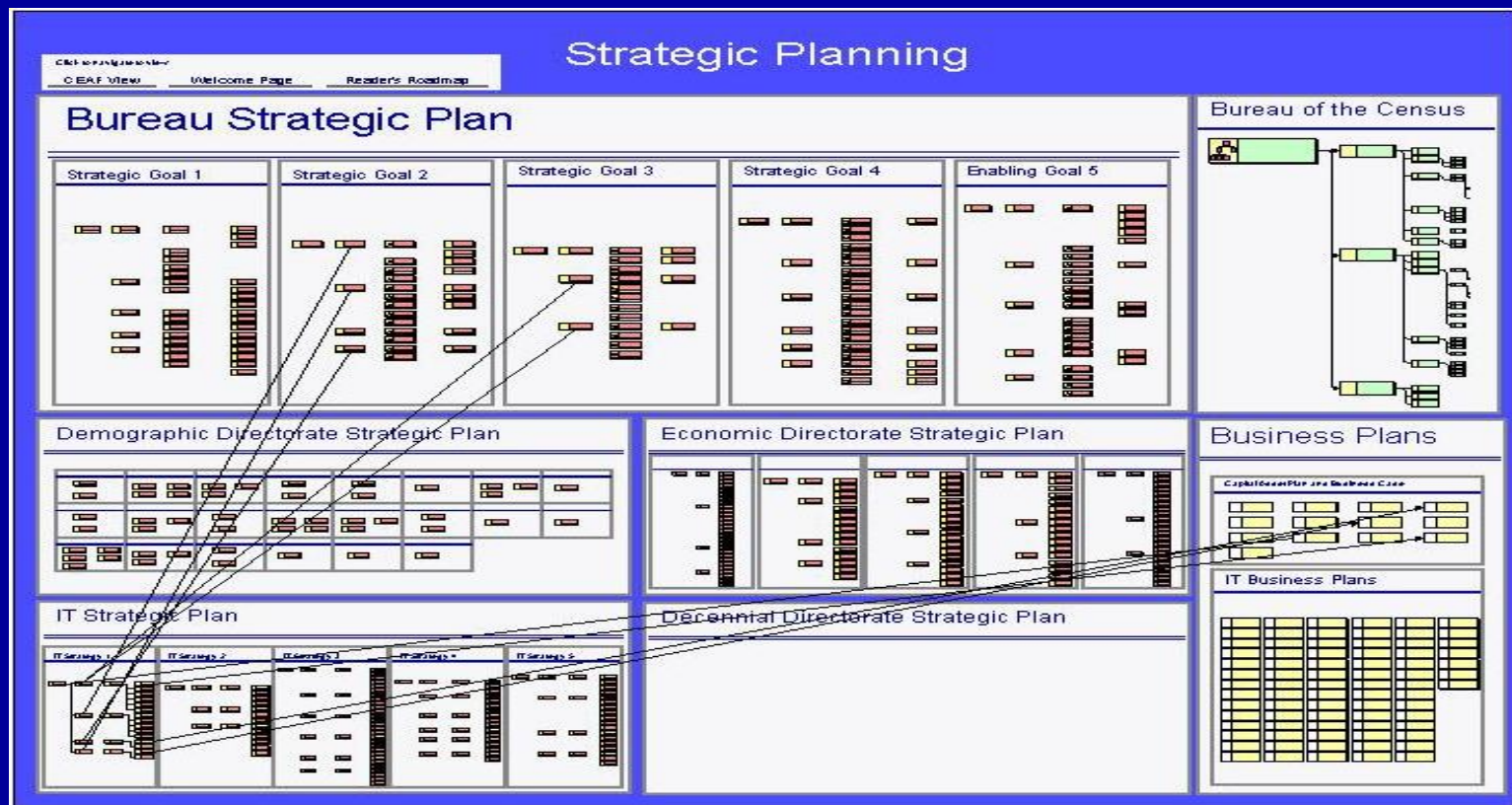
**Target systems**

**and external relationships to external partners and the Federal OMB Reference Models.**

When the user is browsing the actual model, **zooming allows viewing and analysis** of the properties and captured data values that describe the nature of the relationship and the architecture objects.



## Census EA – Strategic Planning View

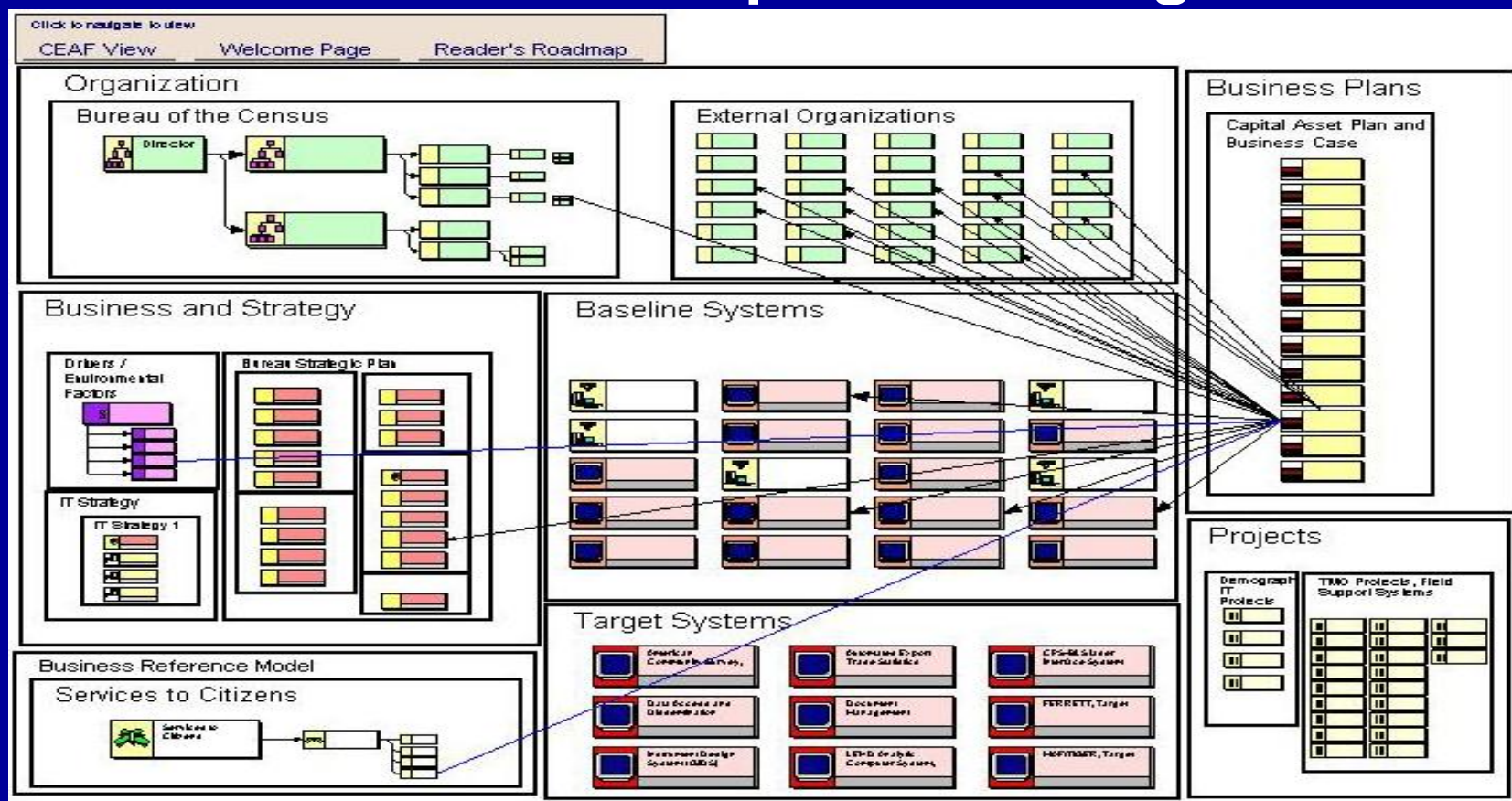


From this screen, the user can zoom to an area of interest to study how a particular IT Strategic Planning element is in support of overall Bureau strategy and the IT investments that are supporting the strategy. The user can also perform similar analysis on other Bureau organization's strategic plans and launch MS Project to view schedules to determine progress towards meeting the strategic goals.





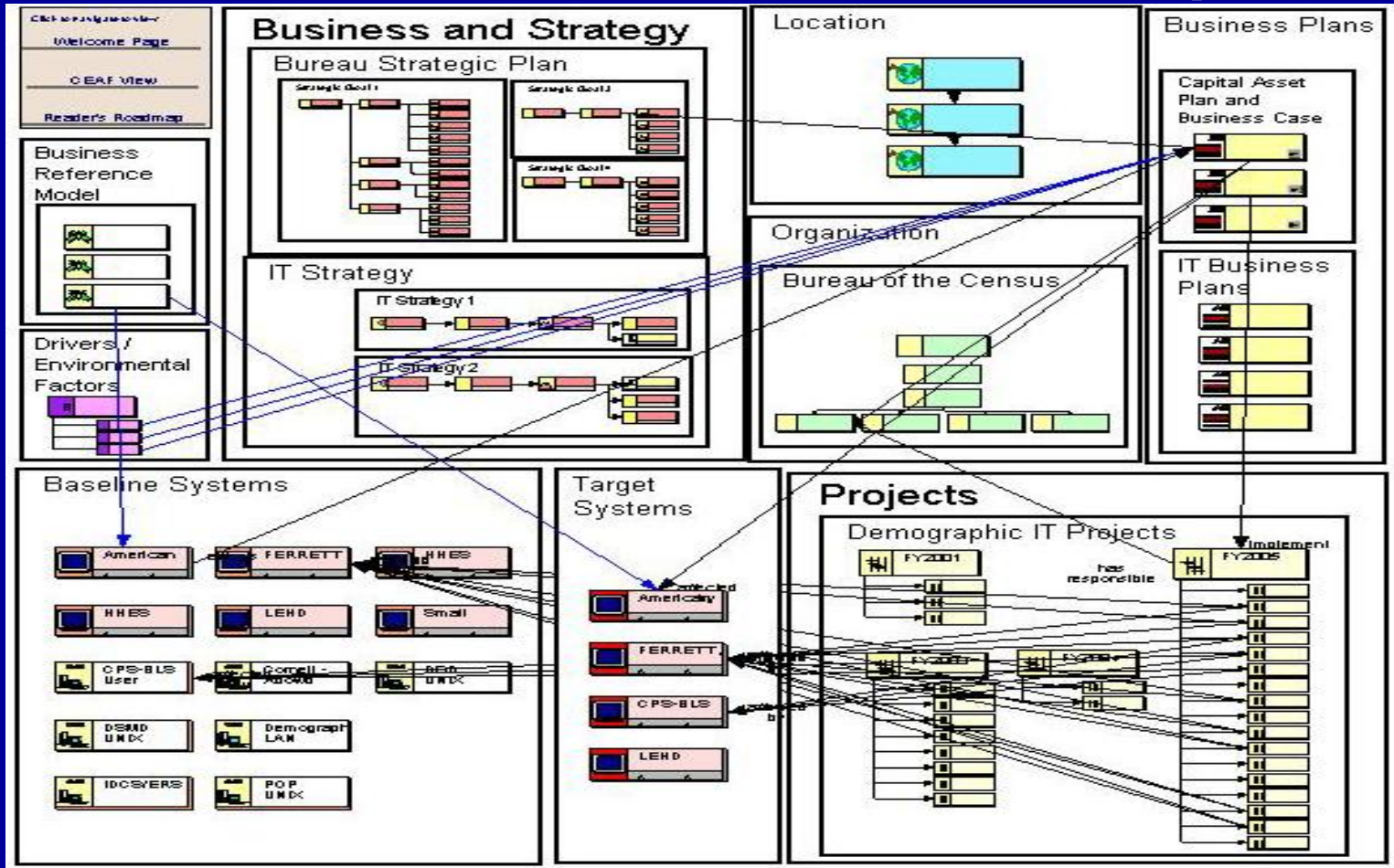
## Census EA – Capital Planning View



The image above shows the result of a user request to view the Capital Asset Planning and Business Case perspective for a particular business plan. From this screen, an architect, manager, or Bureau user can view linkages of the initiative to the responsible organization, and external organizations, drivers for the initiative, as well as the initiative's role in supporting the President's Management Agenda and appropriate OMB Business Reference Model object.



## Census EA – Business Area Perspective



The image above shows the result of an architect's query to find the "neighbor relationships" for the Demographic IT Projects. It displays relationships of these projects to Strategic Plans, drivers, responsible organizations, and baseline and target systems. From this screen, the user can then zoom to an area of interest to view further details associated with an object, launch an application or open a link to an Intranet site containing additional information.





## Outline

- Communication
- Consensus Building
- Collaboration
- Cooperation



## Case Studies: Practical Strategies to Integrate Agency Management Processes EA and CPIC

- “... officials emphasized the important role that a collegial environment played in beginning their EA work and integrating it into the CPIC process. “Affinity Groups” were started around EA across the Department. These groups began informally, then grew to become more formalized as the Enterprise IT Architecture Advisory Group. This provided a forum for idea sharing, debate, and dialogue. Early EA strategies were characterized by the four “Cs”: communication, consensus-building, collaboration, and cooperation.”



## Cooperation – Lessons Learned and Best Practices



## Lessons Learned (Top Five)

- Cultural change is a greater challenge **than the technical challenges**
- EA is a business enabler **not an end unto itself**
- **Develop the model purpose definition and** business questions that the model will be expected to answer
  - **Must be in alignment with the Agency's** strategic plan and business requirements
- **Must have CIO support and championship for Enterprise Architecture (EA)**
- It takes a long time **to develop consensus and senior management buy-in**
- **There must be a shared and mutual vision with senior managers**



## Lessons Learned (Continued)

- The EA process is much more important **than the EA Plan**
- **Great flexibility and creativity are required to modify the process so that it works for your organization**
  - **Requires** continuous review and update
- **Defined by** IT Principles and Standards
- **Invaluable** using mix of in-house and contractor staff and for owner to take the lead directly
- **Critical to learn about EA requirements & EA successes and failures** from all levels



## Lessons Learned (Continued)

- Quick win situations **should be identified early on and implemented** but may be elusive
- **Important to involve business staff in the process**
- Multi-organizational collaborative efforts **can be very effective and successful**
- EA Home Page is essential **and is an excellent communications tool**
- **Technology and business drivers can rapidly change.**
- **JUST DO IT!**



## Contact Information

- **Department of Commerce IT Architecture Affinity Group**
  - <https://secure.cio.noaa.gov/hpcc/docita/>
- **Ira Grossman**  
NOAA OCIO  
(301) 713-3345 x140  
[ira.m.grossman@noaa.gov](mailto:ira.m.grossman@noaa.gov)





## Questions and *Hopefully* Answers

